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THESIS

TEAM COLLABORATION OF THE NORTHEAST AIR DEFENSE SECTOR AND FEDERAL AVIATION ADMINISTRATION DURING THE SEPTEMBER 11, 2001 ATTACKS

by

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September 2008

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13. ABSTRACT (maximum 200 words)

The tragic events of September 11, 2001, brought about changes in the procedures for interagency collaboration. That day air traffic controllers in New York, Boston, Washington, and Cleveland were scrambling due to the hijacking of four American commercial airliners. In their efforts to bring order to chaos the Federal Aviation Administration (FAA) in communication with Northeast Air Defense Sector (NEADS) and North American Aerospace Defense Command (NORAD) scrambled fighter aircraft to escort the airliners. The collaborative teamwork that occurred during this response is recorded in the radio transcripts between NEADS and FAA air traffic controllers. The goal of this thesis is to use the September 11, 2001, NEADS/FAA channel 4 transcripts to provide a real-world example of a team collaborating on a unique, one of a kind problem, to contribute to the effort to validate the structural model of team collaboration, developed under the Collaboration and Knowledge Integration Program, sponsored by the Office of Naval Research. The focus of the model is on individual cognitive processes used during agency or team collaboration with the goal of understanding how individuals and different agencies work together towards reaching a decision.

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TEAM COLLABORATION OF THE NORTHEAST AIR DEFENSE SECTOR AND FEDERAL AVIATION ADMINISTRATION DURING THE SEPTEMBER 11, 2001 ATTACKS

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ABSTRACT

The tragic events of September 11, 2001, brought about changes in the procedures for interagency collaboration. That day air traffic controllers in New York, Boston, Washington, and Cleveland were scrambling due to the hijacking of four American commercial airliners. In their efforts to bring order to chaos the Federal Aviation Administration (FAA) in communication with Northeast Air Defense Sector (NEADS) and North American Aerospace Defense Command (NORAD) scrambled fighter aircraft to escort the airliners. The collaborative teamwork that occurred during this response is recorded in the radio transcripts between NEADS and FAA air traffic controllers. The goal of this thesis is to use the September 11, 2001, NEADS/FAA channel 4 transcripts to provide a real-world example of a team collaborating on a unique, one of a kind problem, to contribute to the effort to validate the structural model of team collaboration, developed under the Collaboration and Knowledge Integration Program, sponsored by the Office of Naval Research. The focus of the model is on individual cognitive processes used during agency or team collaboration with the goal of understanding how individuals and different agencies work together towards reaching a decision.

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TABLE OF CONTENTS

LIST OF FIGURES

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LIST OF TABLES

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I. INTRODUCTION

A. CHRONOLOGY OF SEPTEMBER 11, 2001, MAJOR EVENTS

The following is a timeline of major events during the attacks of September 11, 2001. It highlights the times of the attacks and when agencies involved in responding to the attacks were informed.

1. Timeline

7:59 am American Airlines flight 11 departs Boston, MA, for Los Angeles, CA.

8:14 am United Airlines flight 175 departs Boston, MA, for Los Angeles, CA.

8:20 am American Airlines flight 77 departs Washington Dulles International Airport for Los Angeles, CA.

8:25 am Boston Center aware of hijacking.

8:37 am Boston Center notifies NEADS of a hijacked aircraft.

8:42 am United Airlines flight 93 departs Newark, NJ, for San Francisco, CA.

8:44 am NORAD orders launch of fighter aircraft to escort hijacked aircraft in NY City (Bronner, 2006).

8:46 am AA flight 11 flies into the North Tower of the World Trade Center (WTC) in New York City.

8:51 am NORAD gets first report of North Tower crash from Boston Center.

9:02 am United flight 175 flies into the South Tower of the WTC in New York City.

9:03 am NORAD learns of second possible hijacking/NORAD gets unconfirmed report of a second hit from another aircraft into South Tower of WTC.

9:21 am Boston Center advises NEADS that AA 11 is airborne heading for Washington.

9:24 am NEADS scrambles Langley fighter jets in search of AA 11.

9:37 am AA flight 77 flies into the Pentagon in Washington, DC.

9:59 am the South Tower collapses.

10:03 am United flight 93 crashes into a wooded area in Pennsylvania.

10:07 AM Cleveland Center advises NEADS of UA 93 hijacking.

2. Actions

On September 11, 2001, air traffic controllers in New York, Boston, Washington, and Cleveland were scrambling due to the hijacking of four American commercial airliners. In their efforts to bring order to chaos the Federal Aviation Administration (FAA) in communication with the Northeast Air Defense Sector (NEADS) and the North American Aerospace Command (NORAD) scrambled fighter aircraft to escort the airliners. For all the agencies involved, the hijackings became a heated chase with reports of more than a dozen potential hijackings, some that were real and some that were not. The reports of these false hijackings were caused by the confusion that occurred as a result of misinformation that developed during the attacks (Bronner, 2006). Of the potential hijackings four were real, American 11, United 175, American 77, and United 93. Their initial routes and deviations from these routes are shown in Figures 1 and 2.

Communication between the FAA and NEADS was not precise leading NEADS to search for a flight that no longer existed, American 11, instead of searching for American 77. Another source of confusion arose from the scrambling orders to intercepting fighters which led the pilots on an incorrect flight route. This led the 9/11 Commission Report to conclude that the defense of the U.S. airspace was not conducted in accordance with pre-existing training and protocols. Instead, civilians and military personnel who had never handled a hijacked aircraft that attempted to disappear and eventually crashed into national landmarks, improvised and tried to make order out of chaos. NEADS air defenders had nine minutes notice on the first hijacked aircraft and no advance notice on the second, third, and fourth aircraft.

The 9/11 Commission Report goes on to state,

> we do not believe that the true picture of that morning reflects discredit on the operational personnel at NEADS or FAA facilities. NEADS commanders and officers actively sought information, and made the best judgments they could on the basis of what they knew. Individual FAA controllers, facility managers, and command center managers thought outside the box in recommending a nationwide alert, in ground-stopping local traffic, and, ultimately, in deciding to land all aircraft and executing that unprecedented order flawlessly (National Commission on Terrorist Attacks upon the United States, 2004, p. 31).

B. OBJECTIVES

1. Goals for the Model of Team Collaboration

The goal of this thesis is to use the September 11, 2001, NEADS/FAA channel 4 transcripts to provide a real-world example of a team collaborating on a unique, one of a kind problem, to contribute to the effort to validate the structural model of team collaboration, developed under the Collaboration and Knowledge Integration Program, sponsored by the Office of Naval Research. This model focuses on individual cognitive processes used during collaboration with the goal of understanding how individuals work together towards making a decision.

Changes in technology and defense continue to shape the evolution of military operations. The changes are crucial to prepare the military for the future. According to Letsky, Warner, Fiore, Rosen, and Salas (2007), the critical objective of command and control in the 21st century will be to achieve knowledge interoperability. He goes on to state, "all missions will be interconnected and interdependent, socio-technical factors will increase, and cognitive work will be distributed among people and machines (Letsky, et al., 2007, p. 3)." These factors are essential for teams to be able to collaboratively plan, think, decide, solve problems, and take actions as integrated units (Letsky, et al., 2007).

The inter-agency collaboration captured in the team communications between NORAD, NEADS, and the FAA on the September 11, 2001, channel 4 transcript illustrate how these agencies attempted to bring order to the chaotic events of that morning. Each speech turn in the transcript was coded using definitions of the macro-cognitive processes included in the model of team collaboration. Prior research reported

on in the Garrity (2007) thesis, the Donaldson and Johnson (2008) thesis, and the addition of the coding of these team communications transcripts reported on in this thesis will help determine if the metacognitive and macrocognitive processes in the model truly represent how teams collaborate to solve real-world problems.

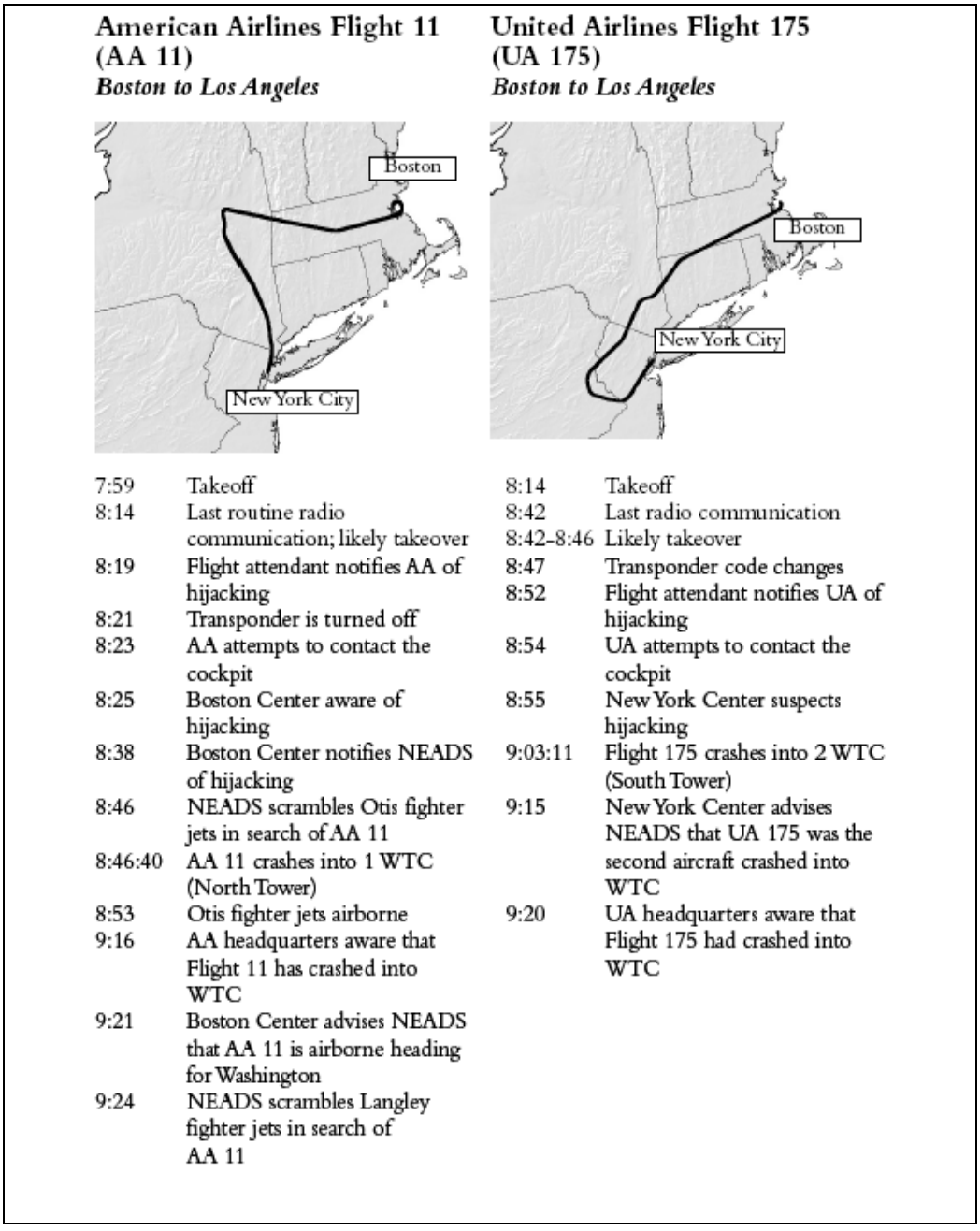
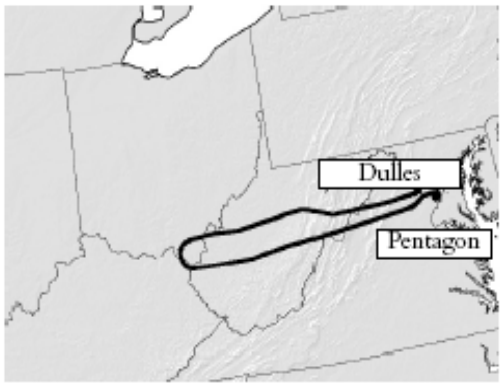


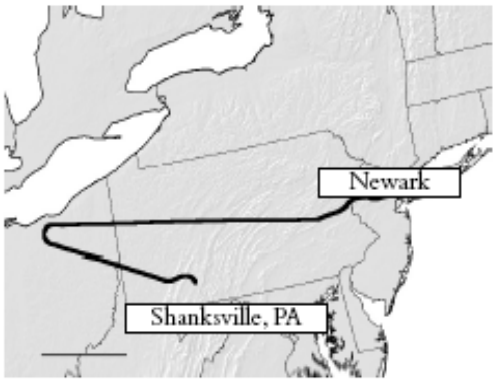
Figure 1. Initial Route and Deviation of AA 11 and UA 175 (From: National Commission on Terrorist Attacks upon the United States, 2004).

American Airlines Flight 77 (AA 77)
Washington, D.C., to Los Angeles



8:20	Takeoff
8:51	Last routine radio communication
8:51–8:54	Likely takeover
8:54	Flight 77 makes unauthorized turn to south
8:56	Transponder is turned off
9:05	AA headquarters aware that Flight 77 is hijacked
9:25	Herndon Command Center orders nationwide ground stop
9:32	Dulles tower observes radar of fast-moving aircraft (later identified as AA 77)
9:34	FAA advises NEADS that AA 77 is missing
9:37:46	AA 77 crashes into the Pentagon
10:30	AA headquarters confirms Flight 77 crash into Pentagon

United Airlines Flight 93 (UA 93)
Newark to San Francisco



8:42	Takeoff
9:24	Flight 93 receives warning from UA about possible cockpit intrusion
9:27	Last routine radio communication
9:28	Likely takeover
9:34	Herndon Command Center advises FAA headquarters that UA 93 is hijacked
9:36	Flight attendant notifies UA of hijacking; UA attempts to contact the cockpit
9:41	Transponder is turned off
9:57	Passenger revolt begins
10:03:11	Flight 93 crashes in field in Shanksville, PA
10:07	Cleveland Center advises NEADS of UA 93 hijacking
10:15	UA headquarters aware that Flight 93 has crashed in PA; Washington Center advises NEADS that Flight 93 has crashed in PA

Figure 2. Initial Route and Deviation of AA 77 and UA 93 (From: National Commission on Terrorist Attacks upon the United States, 2004).

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II. RESEARCH BACKGROUND

A. NORAD AND THE FAA RELATIONSHIP

The U.S. airspace depends heavily on the close interaction between the FAA and the NORAD. NORAD is divided into three sectors, the Canadian NORAD Region, the Alaskan NORAD Region, and the Continental United States Region (CONR). CONR is further divided into two sectors, the Western Air Defense Sector (WADS), and the Northeast Air Defense Sector (NEADS). In the reporting structure, NEADS reports to the Continental U.S. NORAD Region (CONR) headquarters, in Panama City, Florida, which in turn reports to NORAD headquarters, in Colorado Springs, Colorado, as depicted in Figure 3.

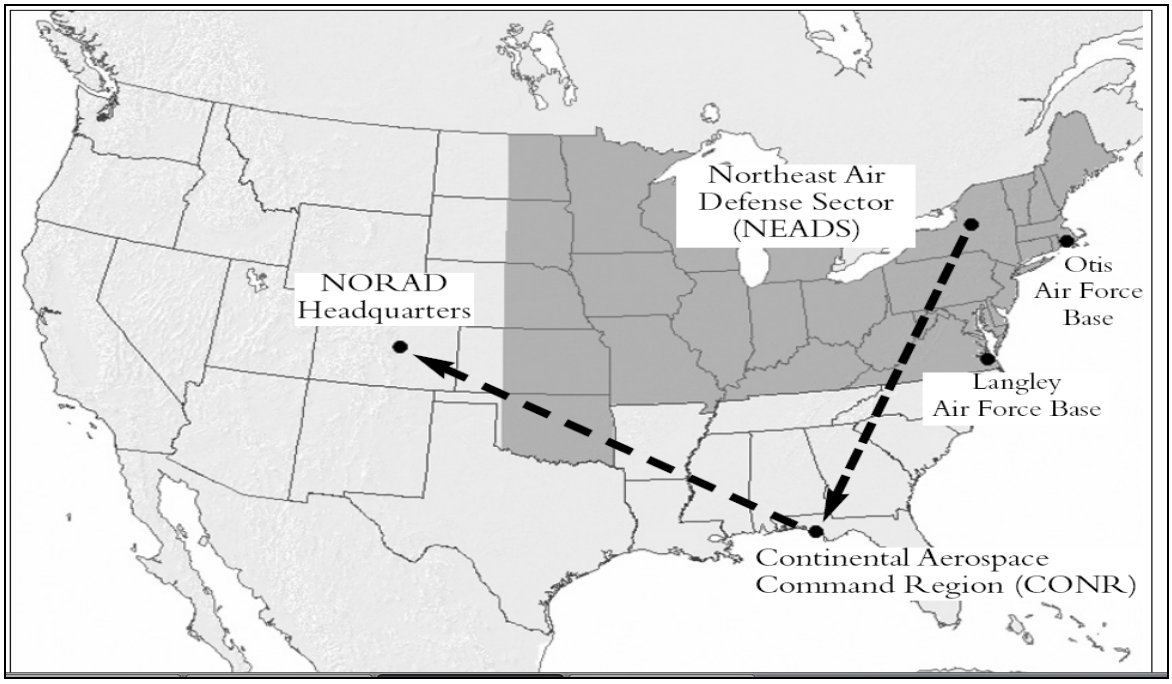

Figure 3. Reporting Structure, Northeast Air Defense Sector (From: National Commission on Terrorist Attacks upon the United States, 2004).

In an effort to understand how NORAD and the FAA worked together on the morning of September 11, 2001, this thesis will review their missions, command and control structures, and working relationships. Figure 4 depicts the NORAD, FAA, and NEADS organizational relationship.

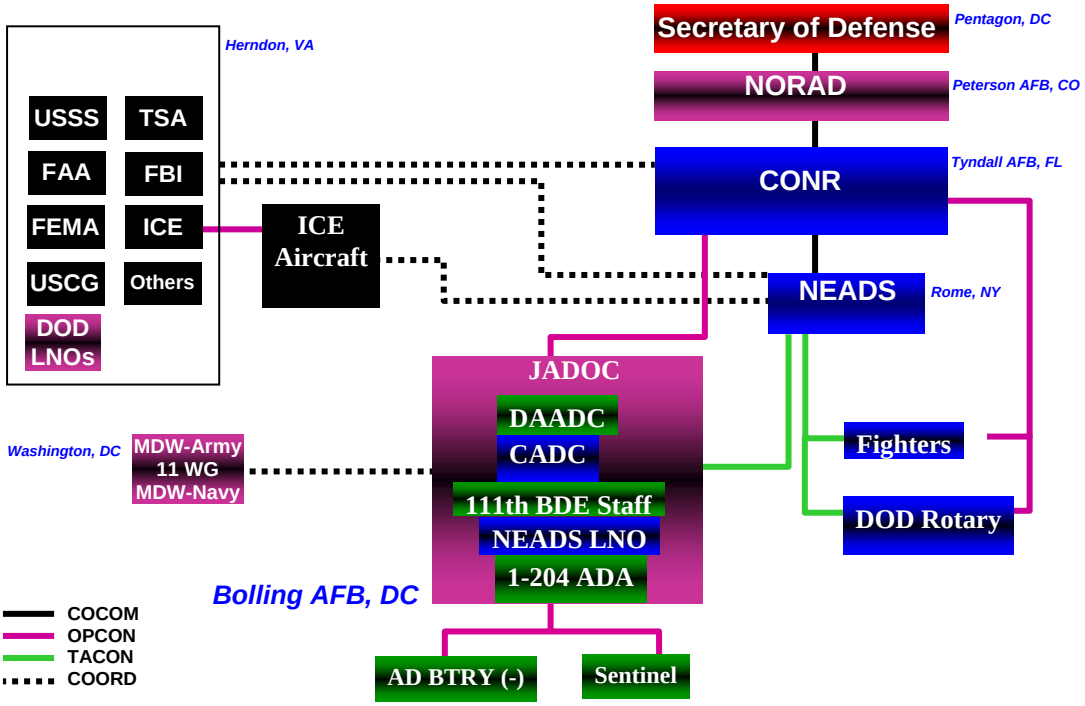

Figure 4. NORAD / FAA / NEADS Organizational Relationship (From: NORAD, 2008).

B. NORAD MISSION

NORAD was established in 1958 in a bi-national agreement between the United States and Canada. Its mission since its establishment has been to defend the airspace of North America and protect the continent. NORAD oversees all missions of aerospace warning and aerospace control for North America. Aerospace warning includes monitoring man-made objects in space, and the detection, validation, and warning of attack against North America whether by aircraft, missiles, or space vehicles, through

mutual support arrangements with other commands (NORAD, 2008). Aerospace control includes ensuring air sovereignty and air defense of the airspace of Canada and the UnitedStates (NORAD, 2008).

Although the NORAD mission does not make a distinction between national and international threats, its original mission was to protect the U.S. airspace from the Soviet threat and therefore it came to define its objective as defending against external attacks. Due to the end of the cold war, the Soviet air threat decreased and so the high number of NORAD alert sites was reduced from its Cold War high of twenty six to seven during the September 11 attacks. Some Pentagon officials even argued for the total elimination of NORAD alert sites. Members of the air defense community, in an effort to prevent the elimination of these sites, made a case for the preservation of NORAD due to the importance of air sovereignty against emerging asymmetric threats to the United States: drug smuggling, state and non-state sponsored terrorism, and the proliferation of weapons of mass destruction and ballistic missile technology (National Commission on Terrorist Attacks upon the United States, 2004).

According to the 9/11 Commission Report, NORAD perceived the dominant threat to be from cruise missiles. During the late 1990s threats of terrorists using aircraft as weapons were identified but exercises to counter this threat were not based on actual intelligence. The biggest threat NORAD perceived from these aircraft was their use in delivering weapons of mass destruction.

Before the attacks of September 11, 2001, any order to shoot down a commercial aircraft would have to be given by the National Command Authority (a phrase used to describe the president and secretary of defense) (National Commission on Terrorist Attacks upon the United States, 2004). Officials had the mindset that any threat or hijacked aircraft that needed to be shot down would come from another country. This would allow time to identify the target and scramble interceptor aircraft. By September 11, since only seven NORAD alert sites remained, commanders worried that NORAD was not postured adequately to protect the United States (National Commission on Terrorist Attacks upon the United States, 2004).

On the morning of the attacks, all the hijacked aircraft were flying in the NEADS sector, based in Rome, NY. NEADS is responsible for the protection of half a million square miles of North American airspace. This area that stretches from the east coast to Tennessee, up through the Dakotas to the Canadian border, including Boston, New York, Washington, D.C., and Chicago (Bronner, 2006). It was in this airspace that the tragic events of September 11, 2001, occurred. Figure 5 illustrates NORAD's organizational structure during the September 11 attacks.

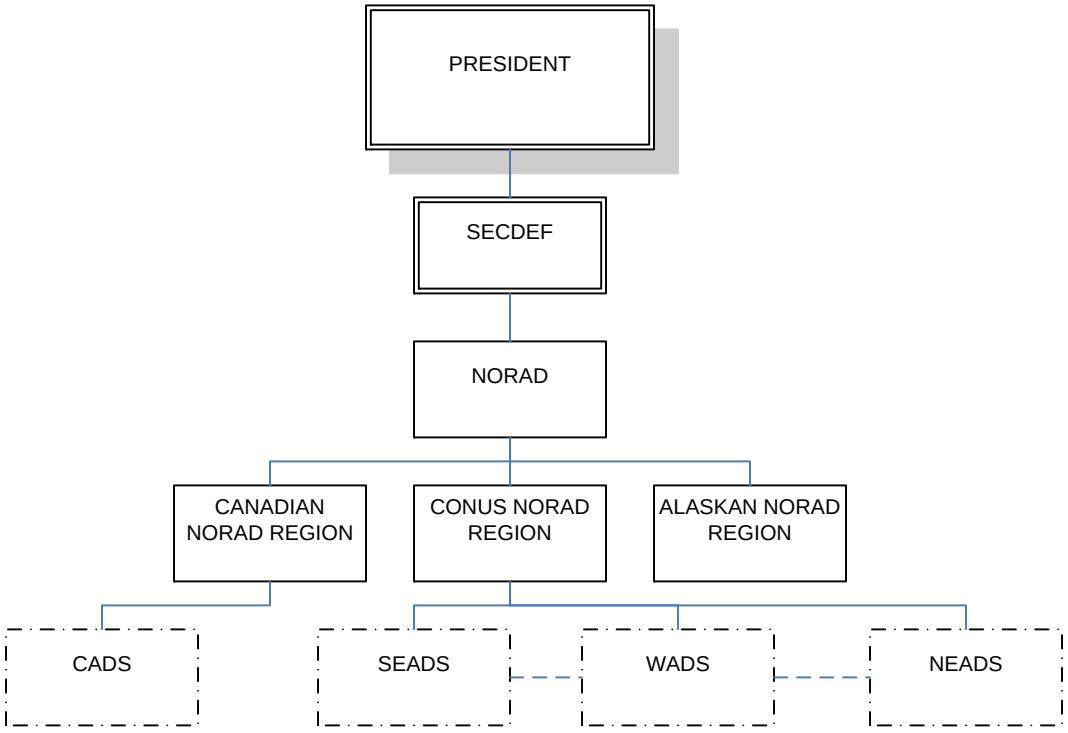

Figure 5. NORAD Organizational Structure

As NEADS watch standers learned of the attacks from air traffic control personnel they would scramble aircraft from two alert sites, Otis Air National Guard Base in Cape Cod, Massachusetts, and Langley Air Force Base in Hampton, Virginia. Any other facility that provided additional interceptor aircraft would find themselves pressed for time since they were not on alert and needed time to arm their fighters (National Commission on Terrorist Attacks upon the United States, 2004).

C. FAA MISSION

The oversight of the safety and security of civil aviation in the United States is performed by the FAA. There are twenty-two air route traffic control centers that help the FAA accomplish their mission. Controllers at these centers are grouped under regional offices and work in close coordination with the national Air Traffic Control System Command Center, in Herndon, VA, which oversees daily traffic flow within the entire airspace system. The operations center at FAA headquarters receives notifications of incidents, including accidents and hijackings (National Commission on Terrorist Attacks upon the United States, 2004).

Each FAA Control Center receives information and makes decisions independently of one another. In the attacks of September 11, the hijacked aircraft were all flying in airspace monitored by the centers in Boston, New York, Cleveland, and Indianapolis. These centers are illustrated in Figure 6.

Figure 6. FAA Air Traffic Control Centers (From: National Commission on Terrorist Attacks upon the United States, 2004).

Each center had some knowledge of what was going on in the national airspace. It is important to note, as stated before, that each center worked and made decisions independently and so what one center knew in Boston was not necessarily known to other centers, the command center, or FAA headquarters (National Commission on Terrorist Attacks upon the United States, 2004). Figure 7 shows the FAA, NEADS sector and NORAD information flow.

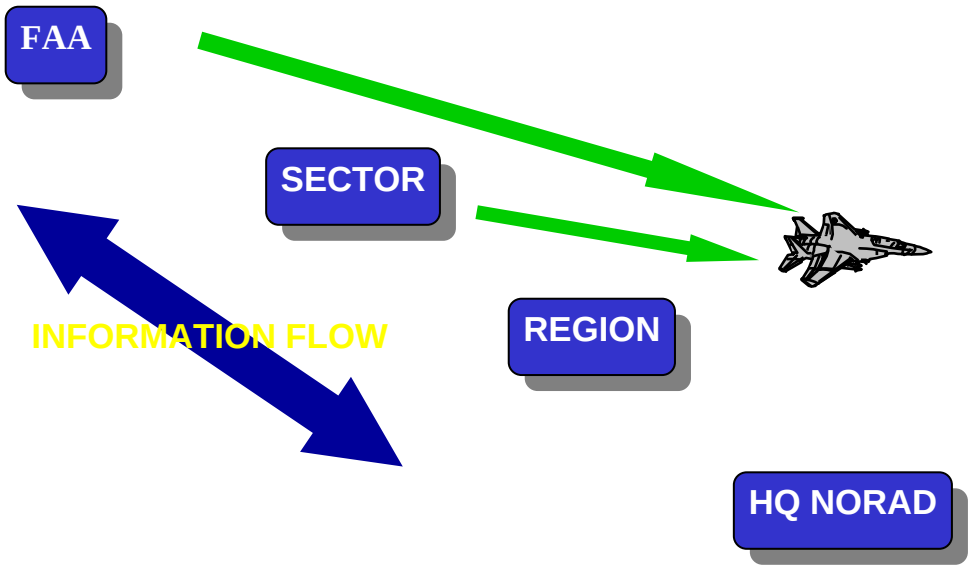

Figure 7. FAA to NORAD information flow (From: NORAD, 2008).

1. FAA and the September 11 Attacks

All aircraft flying above 10,000 feet, under FAA regulations, are required to emit a unique signal while in flight to determine the aircraft's identity and altitude. On September 11 the hijackers were able to make their aircraft disappear by turning off their transponders on three of the four aircraft. It is possible to track aircraft with their transponders off but it becomes more difficult because tracking can only be accomplished through the aircraft's primary radar returns. The aircraft's primary radar return also does not show the aircraft's identity and altitude. Air traffic controllers at centers are so dependent on transponder signals that they usually do not display primary radar returns on their radar scopes (National Commission on Terrorist Attacks upon the United States,

2004). Configuration settings on the scopes can be changed by personnel to see primary radar returns and this was the procedure followed after the transponder signals for three of the four aircraft disappeared. Although plausible for an air traffic controller to lose an aircraft's transponder signal, the loss of the transponder signal in addition to the loss of radio contact, as it happened in the September 11 hijackings, would be a sign of a major system failure or that the aircraft had crashed. After air traffic personnel had attempted to implement operational procedures to deal with the loss of transponders and loss of radio communications and contact could not be made with the aircraft, air traffic personnel knew something was gravely wrong.

2. FAA, Department of Defense (DoD), and White House Teleconferences

After learning of the hijackings, personnel at FAA headquarters began a teleconference with multiple agencies, including DoD, at about 9:20 am. According to the 9/11 Commission Report, the National Military Chain of Command (NMCC) officer who participated stated that, "the call was monitored only periodically because the information was sporadic, it was of little value, and there were other important tasks (National Commission on Terrorist Attacks upon the United States, 2004, p. 36)." The report goes onto state that the teleconference did not play a factor in coordinating a response to the attacks (National Commission on Terrorist Attacks upon the United States, 2004).

The FAA, DoD, and the White House initiated a teleconference around 0930 (EST). Since none of these teleconferences (at least before 1000 EST) included the right officials from the FAA and DoD, the teleconference did not succeed in producing a meaningful coordination of the military and the FAA in response to the hijackings (National Commission on Terrorist Attacks upon the United States, 2004).

Richard Clarke, special assistant to the President, conducted the teleconference from the White House. Records indicate that it began at 9:25 and the agencies that participated were the CIA, the FBI, the Departments of State, Justice, and Defense, the FAA, and the White House shelter, however the FAA and CIA did not join until 9:40.

The initial focus of the teleconference centered on the physical security of the President, the White House, and federal agencies. Soon after the teleconference began the report of a third plane crashing into the Pentagon was received (National Commission on Terrorist Attacks upon the United States, 2004).

Senior officials from FAA headquarters participated in this video teleconference throughout the day. The 9/11 Commission Report did not determine who from DoD participated in the conference but it does report that in the first hour none of the personnel involved in managing the crisis were present. The report goes on to state that in the first hour of the teleconference none of the information conveyed in the White House video teleconference was being passed to the NMCC. As one witness accounts, "it was almost like there were parallel decision-making processes going on; one was a voice conference orchestrated by the NMCC and then there was the White House video teleconference. In my mind they were competing venues for command and control and decision making (National Commission on Terrorist Attacks upon the United States, 2004, p. 36)."

Around 10:03, reports of additional missing aircraft and that a combat air patrol had been established over Washington, DC, were received. Discussion regarding rules of engagement became necessary and soon the President was asked for authority to shoot down aircraft. Confirmation to shoot down aircraft was given at 10:25, but the command had been already relayed to the Pentagon through direct contact with the President (National Commission on Terrorist Attacks upon the United States, 2004).

3. FAA Deputy Director of Air Traffic Statement

The following is an excerpt from the written testimony of Jeff Griffith, FAA Deputy Director of Air Traffic during the 9/11 terrorist attacks, to the National Commission on Terrorist Attacks Upon the United States.

> Before 9/ll, the primary duty of U.S. air traffic controllers was to provide safe, efficient and expeditious air traffic services for our national airspace system (NAS) users. Safety was defined as separating air traffic from other traffic, terrain and weather. FAA controllers were trained to use covert signals to help communicate with crewmembers during hijackings, and to notify appropriate officials when such events occurred, but that training never contemplated the kind of hijackings seen on 9/11. While

FAA and military air traffic controllers supported DoD contingency plans and exercises, air defense was not considered a role for FAA. FAA air traffic personnel supported DoD efforts to counter threats to the U.S. from outside the country, such as prioritization for air defense fighter intercepts and other DoD support missions, shutdown of navigation aids that might assist incoming enemy aircraft, and restrictions to flight operations not supporting air defense roles. But, again, this support contemplated an airborne threat coming from outside of theU.S.. In fact, memorandums of agreement existed between FAA and DoD that specified procedures to be used (flight routes, altitudes, etc.) whenever our Nation's borders (the Air Defense Identification Zone which surrounds the United States) were threatened. Similar procedures had not been considered or developed for use within our borders.

Although the 9/ll terrorist attacks were not anticipated, FAA controller training designed to respond to the various contingencies presented by the National Airspace System (NAS) allowed timely and effective actions to be taken to shut down civil aircraft operations on 9/ll within 4 hours. Based on FAA controller training the following actions were taken:

- Upon learning of the first aircraft "hitting" the World Trade Center, Air Traffic Services called the Headquarters management team together and began preparing to address an aircraft accident.
- When word of the second aircraft "hitting" the World Trade Center was received, Air Traffic Services set up a situation line with all Regional Air Traffic Division Managers, large facility managers and the Command Center. The purpose of this line was to have real-time information flowing to/from field elements. One person was designated to immediately start the data collection process, including radar plots and voice recordings. I assumed a role in the Washington Operations Center.
- In the Washington Operations Center, a direct communications line was set up with the Air Traffic Control System Command Center. This line became the real-time source of information on aircraft reported as missing or experiencing other unusual situations.
- Air Traffic Control Facilities activated procedures contained in Letters of Agreement with DoD organizations. In most cases, all participants realized the situation was beyond anything anticipated when these agreements were written. Decision makers reacted quickly and professionally to ensure the safety of the aircraft operating in the air traffic system, and to support the military response.

- In Headquarters, Air Traffic Services set up an additional situation room in the front office that was occupied by DoD liaison officers who worked on the Air Traffic Services Headquarters staff.
- In the Washington Operations Center, key personnel were assigned to multiple coordination positions with direct telephone communications to other government agency key personnel. There were also other "secure" lines established to coordinate with certain organizations. One of these organizations was the National Military Command Center. As information was received from the FAA Air Traffic Control System Command Center on aircraft reported as missing or experiencing other unusual situations over the direct communications line, that information was announced to all key personnel coordinating with other agencies. These key personnel would immediately provide this information to their counterpart on the phone line. The entire group was situated in a manner to facilitate relaying this information.
- At the FAA Air Traffic Control System Command Center, the military officers assigned to the Air Traffic Services Cell became immediately involved in coordinating FAA Air Traffic Control System Command Center actions with military elements.
- The link for exchange of information with the White House was accomplished through Secure Video Teleconference System. Several of these conferences took place.

Post-9/11 changes, or reforms, made to improve FAA's role in responding to future security breaches include the following:

- After 9/11 the single most significant change in air traffic was establishing a direct communications link between FAA, DoD, and NORAD. FAA air traffic personnel worked with DoD and other federal agencies to put in place procedures for closer communication between FAA, DoD and law enforcement agencies. FAA dedicated air traffic control staffing to NORAD facilities for direct support of air defense measures, and to support the newly-established Domestic Events Net (DEN). FAA established the DEN to link, in real time, FAA security and air traffic personnel at headquarters, the Air Traffic Control System Command Center in Herndon, Virginia, all Centers across the country, all NORAD Air Defense Sectors, and other federal agencies as needed, including Secret Service, Customs, etc.
- FAA developed air traffic procedures to relay timely notifications between FAA and DoD concerning identification and tracking of suspicious pilots/aircraft or targets of interest, specific international

air carriers, and aircraft operations in or near certain airports and areas of interest.

- FAA implemented special security measures and airspace changes, and expanded temporary flight restrictions (TFRs) and other airspace control measures to support DoD and law enforcement agencies engaged in NAS threat detection and/or defensive activities.
- FAA developed software to graphically depict these national security TFRs, then established internet access to them for flight service specialists and NAS airspace users.
- FAA has integrated all long-range radars into the NORAD system so that all of the Continental U.S. may be viewed. Additional work is ongoing to integrate terminal radars to increase the coverage area.
- FAA expanded its notice to airmen (NOTAM) processing capability to support the increased number of NOTAMs required for NAS security restrictions, and set up a Flight Service Operations Support Center to explain complicated airspace security restrictions to flight service specialists.
- FAA developed air traffic control procedures that can be implemented at each threat level established by DHS.
- Air Traffic personnel continue to draw lessons learned from crisis management exercises and real-time events to continually re-evaluate and revise air traffic control plans and procedures for NAS security.
- The FAA developed a set of broad instructions to be used as guidelines if the U.S. airspace system is ever again used in terrorist activities.
- FAA accelerated the physical security program at ATC facilities and placed temporary guards at all en route centers, towers and terminal approach controls.

D. COLLABORATION BETWEEN THE AGENCIES

NORAD and the FAA had developed joint standard operating procedures to deal with the threat of hijacked aircraft. As the 9/11 Commission Report states, "on 9/11, the protocols for the FAA to obtain military assistance from NORAD required multiple levels of notification and approval at the highest levels of government (National Commission on Terrorist Attacks upon the United States. 2004, p. 17)." Established

procedures called for the pilot of the hijacked aircraft to notify the air traffic controllers either via radio or by squawking 7500, the universal code to represent a hijacked aircraft. As soon as controllers were informed of the hijacked aircraft they would inform their supervisors, who would then pass up the information to higher management at FAA headquarters. Once it was determined that an aircraft had been hijacked the report would be passed to the director of the FAA Office of Civil Aviation Security. Once at this office operating procedures called for the notification of Pentagon's NMCC and the request of military escort aircraft to shadow the flight, report anything unusual, and aid search and rescue in the event of an emergency. The NMCC would then seek approval from the Office of the Secretary of Defense to provide military assistance and once the approval was given the orders would be transmitted to NORAD's chain of command (National Commission on Terrorist Attacks upon the United States, 2004).

The FAA hijack coordinator was kept updated by the NMCC, who also assisted FAA centers in their coordination with the military. FAA traffic control facilities, along with radars helped NORAD track the hijacked aircraft and would attempt to have the hijacked aircraft squawk 7500. These protocols though, did not consider the possibility of an intercept. The protocol assumed that fighter escort would be discreet, vectored to a position five miles directly behind the hijacked aircraft where it could perform its mission to monitor the aircraft's flight path (National Commission on Terrorist Attacks upon the United States, 2004). As pointed out in the 9/11 Commission Report the protocols in place for the FAA and NORAD to respond to a hijacking presumed that:

- the hijacked aircraft would be readily identifiable and would not attempt to disappear;
- there would be time to address the problem through the appropriate FAA and NORAD chains of command
- hijackings would take the traditional form: they would not be a suicide hijacking designed to convert the aircraft into a guided missile.

According to the 9/11 commission report these protocols were unsuited for the events that occurred (National Commission on Terrorist Attacks upon the United States, 2004).

E. NATIONAL MILITARY CHAIN OF COMMAND

In the NMCC, the deputy director for operations immediately thought the second tower strike was a terrorist attack. The NMCC's role in such an emergency is to bring together all relevant personnel and establish the chain of command between the National Command Authority, the President and the Secretary of Defense, and those who need to carry out their orders (National Commission on Terrorist Attacks upon the United States, 2004).

Soon after the second air strike, the NMCC deputy director for operations called for an all purpose significant event conference. At this conference a quick summary of events were discussed which included, two aircraft striking the World Trade Center, confirmation of a third hijacked aircraft, and the scrambling of military escort aircraft. Records indicate that the FAA was not added to the call and therefore the FAA was not present(National Commission on Terrorist Attacks upon the United States, 2004). Confirmation of a hijacked aircraft (American 11) heading toward the Capital was reported and the NMCC deputy director transitioned to an air threat conference call. NORAD was able to confirm that American 11 was airborne and heading towards Washington, relaying erroneous FAA information since American 11 had already crashed into North Tower (National Commission on Terrorist Attacks upon the United States, 2004).

The air threat conference call lasted over eight hours. Participants in the call included The President, Vice President, Secretary of Defense, Vice Chairman of the Joint Chiefs of Staff, and Deputy National Security Advisor Stephen Hadley. According to the 9/11 Commission Report, teleconference operators worked feverishly to include the FAA, but equipment problems and the difficulty of finding secure phone numbers prevented the participation of the FAA. When the FAA was finally able to join the teleconference around 10:17 am, the FAA representative had no familiarity with or responsibility for hijackings, no access to decision makers, and none of the information available to senior FAA officials (National Commission on Terrorist Attacks upon the United States, 2004).

The 9/11 Commission Report found no evidence that NORAD's top commanders, in Florida or Cheyenne Mountain, coordinated with their counterparts at FAA headquarters to improve awareness and organize a common response. The Commission did determine that lower level officials improvised by bypassing the chain of command and directly contacting NEADS after the first hijacking.

The following events timeline was obtained from the 9/11 Commission Report and shows how the events unfolded (National Commission on Terrorist Attacks upon the United States, 2004, p. 38).

> At 9:39, the NMCC's deputy director for operations, a military officer, opened the call from the Pentagon, which had just been hit. He began: "An air attack against North America may be in progress. NORAD, what's the situation?" NORAD said it had conflicting reports. Its latest information was "of a possible hijacked aircraft taking off out of JFK en route to Washington D.C." The NMCC reported a crash into the mall side of the Pentagon and requested that the Secretary of Defense be added to the conference.
>
> At 9:44, NORAD briefed the conference on the possible hijacking of Delta 1989. Two minutes later, staff reported that they were still trying to locate Secretary Rumsfeld and Vice Chairman Myers. The Vice Chairman joined the conference shortly before 10:00; the Secretary, shortly before 10:30. The Chairman was out of the country.
>
> At 9:48, a representative from the White House shelter asked if there were any indications of another hijacked aircraft. The deputy director for operations mentioned the Delta flight and concluded that "that would be the fourth possible hijack." At 9:49, the commander of NORAD directed all air sovereignty aircraft to battle stations, fully armed.
>
> At 9:59, an Air Force Lieutenant Colonel working in the White House Military Office joined the conference and stated he had just talked to Deputy National Security Advisor Stephen Hadley. The White House requested (1) the implementation of continuity of government measures, (2) fighter escorts for Air Force One, and (3) a fighter combat air patrol over Washington, D.C.
>
> By 10:03, when United 93 crashed in Pennsylvania, there had been no mention of its hijacking and the FAA had not yet been added to the teleconference.

F. PRIOR KNOWLEDGE?

Between 1991 and 2001, one of NORAD's sectors conducted exercises simulating a foreign hijacked airliner crashing into a building in the United States. NORAD claims these exercises were solely to test procedures and were no indication that NORAD had any reason to believe these scenarios would happen in the real world (Starr, 2004).

Barbara Starr, CNN correspondent, states "it is unclear whether the simulated scenario was that of a hijacked plane being used as a missile intentionally crashing into a building, or an out of control hijacked plane. NORAD officials said the exercise involved simulating a crash into a building that would be recognizable if identified, but the building was not the World Trade Center or the Pentagon. The exercise involved an aircraft being hijacked as it flew into United States airspace from abroad, a different scenario from what happened on September 11, 2001."

The exercise involved military aircraft and a command post exercise in which communication procedures were practiced. NORAD officials emphasized that had it been a real world event, NORAD would have instituted standard procedures to try to contact the aircraft and keep it from crashing. At the time, NORAD commander, GEN Ralph Eberhart said, "We have planned and executed numerous scenarios over the years to include aircraft originating from foreign airports penetrating our sovereign airspace. Regrettably the tragic events of 9/11 were never anticipated or exercised."

According to a statement from NORAD to Barbara Starr, "Before September 11th, 2001, NORAD regularly conducted a variety of exercises that included hijack scenarios. These exercises tested track detection and identification; scramble and interception; hijack procedures; internal and external agency coordination and operational security and communications security procedures. All of those tasks are the responsibility of NORAD."

The statement continues:

> NORAD did not plan and execute these types of exercises because we thought the scenarios were probable. These exercises were artificial

simulations that provided us the opportunity to test and validate our processes and rules of engagement with the appropriate coordination between NORAD's command headquarters, its subordinate regions and sectors and National Command Authorities in Canada and the United States.

Since 9/11 we have continued our exercise program having conducted more than 100 exercises, all of which have included mock hijacks. NORAD has flown 35,000 sorties and scrambled or diverted fighters from air patrols nearly 1,800 times. Additionally, NORAD fighters out of Florida have intercepted two hijacked aircraft since 9/11; both originating from Cuba and escorted to Key West in Spring 2003. NORAD remains vigilant and its tolerance for any anomaly in the sky remains very low. The 9/11 commission has been informed about our exercises that include hijack scenarios.

At the NORAD headquarters' level we normally conducted four major exercises a year, most of which included a hijack scenario. Since 9/11 however we have conducted more than 100 exercises, all of which included at least one hijack scenario.

G. IMPROVEMENTS SINCE 9/11

Since 9/11, NORAD forces remain at a heightened readiness level to counter potential threats to North America (Kucharek, 2008). To protect metropolitan areas and critical infrastructure facilities, pilots fly irregular air patrols over these areas. Over 36,000 mishap-free sorties have been flown by NORAD pilots over the U.S. and Canada in support of Operation NOBLE EAGLE. Since 11 September 2001, NORAD has scrambled or diverted aircraft more than 1600 times in response to potential threats. Aerial refueling tankers are prepared to support scrambled fighters and E-3 Airborne Warning and Control System aircraft augment situational awareness.

NORAD has implemented an integrated air defense system to defend the National Capital Region. Exercises improving agencies interoperability have increased, with more than 100 command-level exercises to test these rules of engagement and to train designated authorities. NORAD and the FAA have partnered to enhance their ability to monitor air traffic within the interior of the country.

Since 9/11 NORAD monitors the FAA's Domestic Events Network (DEN) which is a 24/7 FAA sponsored telephonic call network that includes all of the FAA’s major air

traffic facilities in the U.S. The DEN also includes other government security agencies that monitor the DEN. The purpose of the DEN is to share "real-time" information with the appropriate authorities that deal with an emerging, potential air-related incident within the continental United States. This is a significant improvement in interagency coordination since 9/11 as it allows all required agencies and organizations to continuously share information.

The FAA has a representative stationed in the NORAD command center and the military has representatives who sit in FAA control centers to facilitate term interoperability and understanding. Moreover, the President and Secretary of Defense have revised and approved rules of engagement to confront hostile acts within the national airspace, which help ensure the protection of citizens and critical infrastructure. These rules of engagement define what NORAD and other agencies involved can and cannot do in responding to a situation.

H. FOCUS OF THE MODEL

Various models of team collaboration exist that focus on different aspects of collaboration. In the structural model of team collaboration the aim is to understand the macrocognitive processes and their relationship to collaborative team decision making. The model was developed by Warner, Letsky, and Cowen and has continued to develop with ongoing research. Three main tasks which are the focus of the model, team data processing, developing a shared understanding among team members, and team decision-making and course of action selection (Garrity, 2007).

The original model contained four interdependent stages of team collaboration; these stages were, *knowledge construction*, *collaborative team problem solving*, *team consensus*, and *outcome evaluation and revision,* as illustrated in Figure 8. As the model has evolved, the four stages were modified and a new stage added by splitting the *knowledge construction* phase into *individual knowledge building* and *team knowledge building.* The new five interdependent stages are *individual knowledge building, team knowledge building, developing shared problem conceptualization, team consensus development,* and *outcome appraisal.*

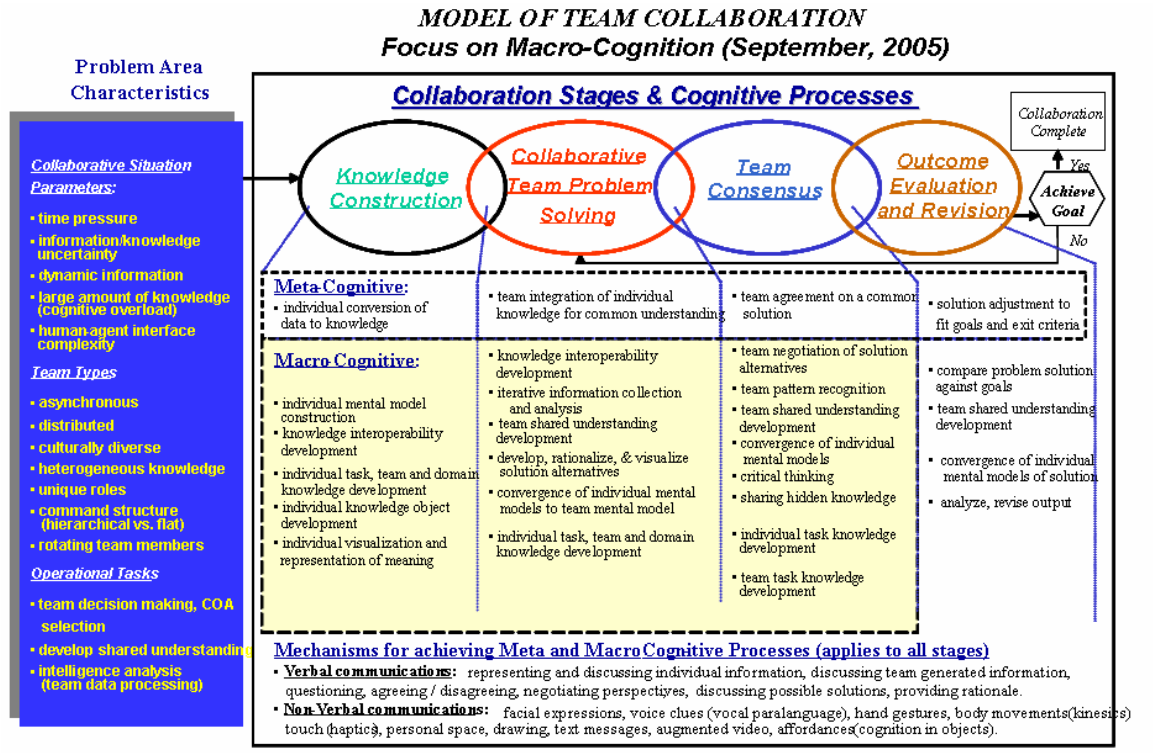

Figure 8. Structural Model of Team Collaboration (From: Warner, Letsky, & Cowen, 2005).

1. Previous Studies

Initial studies to validate the model of team collaboration were performed by analyzing transcripts from Maritime Interdiction Operations (MIO) and from air warfare teams (Hutchins, Bordetsky, Kendall, Looney & Bourakov, 2006). Other research to validate the model of team collaboration includes the Garrity (2007) thesis, "Investigating Team Collaboration of the Fire Department of New York Using Transcripts from September 11, 2001." This thesis investigated the effects of loss of situational awareness and adherence to standard operating procedures as an indicator of efficient radio communication. Efficient radio communication expedites the process of moving the team towards their ultimate goal; on September 11, 2001, that goal was to rescue the thousands of civilians trapped in the Twin Towers of the World Trade Center. The thesis used the

structural model of team collaboration to help the Fire Department of New York understand how it works together as a team, and offered suggested improvements (Garrity, 2007).

A similar thesis, **"**Validating a Model of Team Collaboration at the North American Aerospace Defense Command Using Selected Transcripts from September 11, 2001" also analyzed transcripts (channel 2) of the NEADS / FAA collaboration on September 11, 2001. This thesis investigated the teamwork and collaboration that occurred between NEADS, their counterparts at the Federal Aviation Administration and various air traffic control centers in order to provide military air support and ground civilian air traffic over the United States (Donaldson & Johnson, 2008).

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III. LITERATURE REVIEW

A. COMPLEX TEAM PROBLEM SOLVING

Several definitions for describing a team are found in the research literature. Teams can be considered as "interdependent collections of individuals who share responsibility for specific outcomes for their organizations" (Sundstrom, De Meuse, & Futrell, 1990, p. 120) or as "two or more people who interact dynamically, interdependently and adaptively toward a shared goal" (Salas, Dickinson, Converse, & Tannenbaum, 1992, p. 4). The need for teams to work together to plan, think, decide, solve problems, and take actions as integrated units require collaboration and effective team decision making among all involved. These complex factors are essential in team problem solving if teams are to be successful in the accomplishment of their missions.

Military, government, and business teams possess heterogeneous knowledge, unique roles, rotating members, and a hierarchical or flat command structure (Letsky, Warner, Fiore, Rosen, & Salas, 2007). Letsky et al. (2007) state, "each of these factors represents a particularly challenging form of team structure given that they possess a compressed developmental life span and heterogeneous composition, the combination of which potentially exacerbates problems arising from team collaboration (Letsky, et al., 2007, p. 5)." These military and government teams work in an environment characterized by ill-structured and ambiguous situations, where consequences for error are severe (Letsky et al., 2007).

In complex military team problem solving situations, the emphasis is on sharing information and decision-making (Elliot, Schiflett, Hollenbeck, & Dalrymple, 2001). Factors such as collection, protection, and the interpretation of information are vital for the successful accomplishment of the mission. Information must flow from one point to the next with many obstacles that prevent its smooth flow such as, a limited time frame, circumstances of uncertainty, fast paced events, and hostile intent (Elliot, et al., 2001). Members of the team must evaluate all information received, filter out unnecessary information and then communicate this information to other team members or the

decision maker. Throughout the process team members must constantly analyze the information to determine its accuracy. The primary role of team members is the collection, interpretation, and distribution of information to support decisions regarding the allocation of effort and resources (Elliot, et al., 2001).

All team members must be able to problem solve and when the solution fails to answer the problem be able to quickly identify an alternative (McNeese, Salas, & Endsley, 2001). Because of the need to quickly find an alternate solution, McNeese et al. (2001) state that it becomes difficult to evaluate the team according to its adherence to a pre-specified coordination of actions. Teams in general can be distinguished by the degree to which the group or its leader must generate coordination strategies during performance execution, as opposed to following a predetermined and static plan. The execution of a pre-coordinated plan is challenging in itself but trying to execute the plan as situations and mental models change is even more difficult and requires constant adjustment by team members to maintain accurate situational awareness.

1. Team Situational Awareness

Situation awareness is defined as "the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projections of their status in the near future" (Endsley, 1988, p. 97). Interpretation of external events by team members and adaptation of their mental models to the changing circumstances is what allows team members to achieve and maintain situation awareness. Once individual situation awareness is achieved members must pass their interpretation of information to the team or decision makers to formulate the best possible response.

Communication of this information is essential for successful performance by decision makers in a wide variety of domains. In complex decision-making domains the requirement for situation awareness is compounded by the presence of multiple team members and multiple teams (Endsley & Jones, 2001). Members of the team must have an understanding of all communication systems used, but also the amount of information or lack of information that other team members may or may not have, given that these factors play a part in ultimate decision making and successful completion of the mission.

Within the team, each member is responsible for developing their own situational awareness. When team members lose or fail to gain situation awareness they are putting the mission in jeopardy since it is possible for the team as a whole to lose situational awareness. On September 11, 2001, NEADS personnel and FAA air traffic controllers across the northeastern United States did not have good situational awareness due to the uniqueness and large scale nature of the attacks.

Team situational awareness can be thought of as "the degree to which every team member possesses the situational awareness required for his or her responsibilities" (Endsley, 1995, p. 39). For the team to be successful in problem solution generation all team members must know which information they are responsible for and share this information. It is not sufficient if one knows it perfectly but the other does not. Not fulfilling their responsibility, that team member will become the team's weakest link and decrease the chance of successful mission accomplishment for the team. The state of the team's situation awareness will change over time just as individual situation awareness will change over time (Endsley & Jones, 2001).

Team situation awareness is an important factor for performance in a wide range of environments and operational settings (Endsley, 1995). The greater part of a team's situational awareness depends heavily on developing accurate individual situational awareness amongst team members. When each individual that is part of the team achieves situational awareness, the chances of successful mission accomplishment for the team are increased.

To facilitate the process of obtaining team situational awareness members of the team must have shared mental models or shared knowledge bases (Elliot, et al., 2001). In complex task situations, as was the case of the NEADS / FAA mission on the morning of September 11, 2001, shared strategic knowledge bases were crucial in order to ensure the utilization and continuous updating of cues in the situation assessment process. This would enable the team to develop high levels of team situation awareness.

2. Team Coordination

Coordination is the attempt of multiple entities to act in concert in order to achieve a common goal by carrying out a plan they all understand (Klein, 2001, p.70). Given this definition, team coordination during the September 11 attacks was somewhat degraded due to the unprecedented and overwhelming attacks. As Klein states, "coordination assumes entities are acting in concert (Klein, 2001, p.71)." Acting in concert for the NEADS and FAA agencies became a difficult task because some of the information known by certain agencies was not known by others. Responsibility for aircraft tracks became a challenging task after air traffic controllers lost the ability to communicate with the aircraft. Some FAA controlling stations had outdated phone numbers needed to communicate with the military, which in turn resulted in lost valuable time in the decision making process. All these factors contributed to the degradation of team coordination.

Coordination in teams is based on the effective use of technology and sharing accurate information between team members (Caldwell & Garrett, 2007). The team must be able to integrate information from individual members and be able to create a coherent understanding in order to develop efficient solutions. The inability to integrate information by the team will likely result in information being overlooked and decrease the chance for an accurate solution generation.

Since the September 11 attacks, improved coordination procedures and technology have been implemented to coordinate between the agencies. New common operating picture systems were installed to improve the shared mental model amongst the team. Personnel from each of the agencies were assigned to supporting agencies to decrease the potential for confusion when communicating. The implementation of the Domestic Events Network (DEN) enables agencies to join the communications network of collaborating agencies at any time which can improve the coordination between agencies during crisis management.

3. Anticipatory Thinking

The capacity of decision makers to perform anticipatory thinking is key to the solution option generation process. Anticipatory thinking is defined as the process of recognizing and preparing for difficult challenges which may not be understood until they are encountered (Klein, Snowden, & Pin, 2007). An important distinction is made between anticipatory thinking and prediction. Prediction attempts to deduce future states of the world while anticipatory thinking deduces these states and prepares a response.

Obstacles that hinder anticipatory thinking include: overconfidence in one's abilities, organizational barriers, disconnects between personnel, complexity, and team coordination (Klein, et al., 2007). Although some of these challenges were present in the NEADS and FAA agencies during the attacks, the agencies have made progress in reducing these barriers. Eradication of these barriers in all agencies is necessary to improve collaboration and ultimately the chance for mission success.

a. Types of Anticipatory Thinking

Three types of anticipatory thinking are *pattern matching*, *trajectory tracking*, and *conditional* (Klein, et al., 2007). During *pattern matching* personnel develop a bank of knowledge from experience and rely on this knowledge to alert them if a situation does not follow its regular course of action. As more experience is gained the levels of accuracy and success in anticipatory thinking are improved. This gained experience was evident in air traffic controllers during the September 11 attacks as they knew that the loss of transponders and radio communications with the aircraft meant that something had gone awfully wrong. Unfortunately due to the uniqueness of the attacks, no prior pattern had been built to enable the team to anticipate that these hijacked aircraft would be used as missiles, thus the *pattern matching* form of anticipatory thinking could not be used to predict this event.

In *trajectory tracking* individuals prepare themselves for how the events are unfolding and how long it will take them to react. This type of thinking requires people to "get ahead of the curve" (Klein, et al., 2007). For example, during the September 11 attacks, Boston air traffic controllers shut down their airspace to prevent

other possible hijackings of aircraft. Instead of waiting for reactions from the higher chain of command, being aware that this would take some time, the Boston controllers prepared themselves by not permitting any more possibly hijacked aircraft to depart or enter the Boston airspace.

Conditional anticipatory thinking uses connections between events to make a response (Klein, et al., 2007). During the attacks, as commercial aircraft were hijacked and eventually flown into buildings, senior leadership at the FAA, NORAD, and the Pentagon saw a pattern emerging. Their response to this emerging pattern was to shut down the national airspace and if necessary shoot down threatening, non-responsive aircraft.

4. Team Design

The need for effective teams has led to considerable progress on methods for improving the performance of teams (MacMillan, Paley, Levchuk, Entin, Freeman, & Serfarty, 2001). An effective team has the following characteristics (Salas, Dickinson, Converse, & Tannenbaum, 1992): (1) dynamic, interdependent, and adaptive interaction between team members; (2) a common goal, mission, or objective; (3) some organizational structure of the team members; and (4) each individual team member has specific tasks or functions. Task completion requires the dynamic interchange of information, the coordination of task activities, and constant adjustment to task demands.

A majority of the focus on team performance has concentrated around two factors: improving team performance through training and collaborative tool technology. MacMillan, et al. (2001) suggest that a third factor can be manipulated to improve team performance, the team structure. In order to put together a high performing team, factors such as the right knowledge, skills, shared mental models, and abilities must be taken into account. These factors along with the right training will further improve team performance. Figure 9 illustrates the three facets of team performance and the tools and processes available to support them as suggested by MacMillan et al.

By putting the right team together, where shared mental models are common, members possess the right knowledge and skills, and abilities are shared amongst the team, performance will be improved, thus increasing the opportunity for success in the mission.

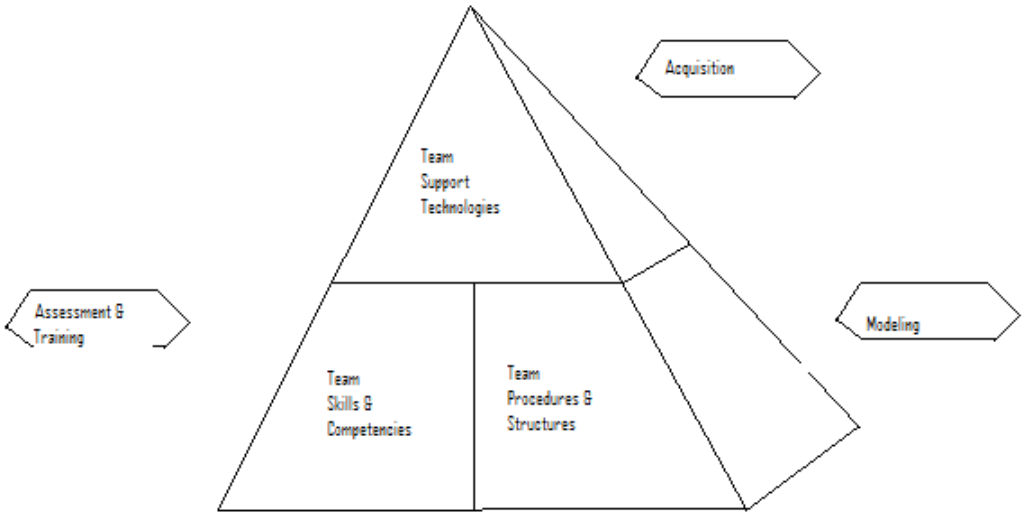

Figure 9. Three facets of team performance (From: MacMillan, et al., 2001).

5. Macrocognition Traits in Collaborative Teams

Macrocognition is described as the way cognition emerges in natural environments (Letsky, Warner, Fiore, Rosen, Salas, 2007). Letsky et al. (2007) further define macrocognition as the "internalized and externalized high-level mental processes employed by teams to create new knowledge during complex, one of a kind collaborative problem solving." The term "high-level" is defined by Letsky et al. (2007) as "the process of combining, visualizing, and aggregating information to resolve ambiguity in support of the discovery of new knowledge and relationships. Letsky et al. (2007) define internal processes as high-level mental processes that occur at either the team or individual level, and which cannot be expressed through external means as in writing, speaking, gesture, and can only be assessed by qualitative metrics like cognitive mapping or think out loud protocols or by using surrogate quantitative metrics such as pupil size or

galvanic skin response. They also describe externalized processes as higher level mental processes that occur at either the individual or team level, and which are associated only with actions that are observable and measurable in a consistent, reliable, repeatable manner or explicitly through the conventions of the subject domain having standardized meanings. Teams in complex environments where collaborative problem solving is focused on one-of-a-kind situations utilize these processes (Fiore, 2007). Several unique characteristics of macrocognition that are found in collaborative teams are depicted in Table 1.

Table 1. Characteristics of Macrocognition in Teams (From: Letsky, et al., 2007).

Unit of Analysis	*The unit of analysis includes both the individual team member and the whole team because of the unique macrocognitive processes operating at the individual and team level.*
Level of Analysis	*Cognitive activities are analyzed at a high level because of the limitations in using micro cognitive processes to explain higher order decision making mechanisms; additionally, it may be at this level that critical variance emerges, a variance important to differentiating good from poor performers.*
Measurement Focus	*Focus on both internalized and externalized mental processes employed by team members during complex, one-of-a-kind, collaborative problem solving.*
Method of Study	*Macro cognitive processes can be empirically studied in the lab and in operational field settings given domain rich collaborative problem solving scenarios.*
Nature of Occurrence	*Macro cognitive processes (i.e. internalized and externalized) occur during team member interaction (i.e. socially and collaboratively mediated) and are influenced by the artifacts in the environment.*
Dynamic Feature	*Macro cognitive processes develop and change over time.*
Environmental Context	*Macro cognitive processes are domain dependent and collaboration environment dependent (e.g. face-to-face versus asynchronous, distributed collaboration tools).*

Macrocognition as a concept provides a structure for the comprehension of cognitive processes and how they directly influence the performance of tasks (Klein D., Klein H., Klein G., 2000). Klein et al. (2000) state that macrocognition's time scale is measured in seconds, minutes, hours, or longer, vice tenths or hundredths of a second.

B. TEAM COGNITION AND AUTOMATION

Today's technology provides team members greater efficiency in performing their duties. Though this increased dependence of teams on automation has also increased the challenges these teams face in their operational environment (Cuevas, Strater, Caldwell, Fiore, 2007). Systems designed to support human operators during task performance such as computer decision support systems and radio controlled robotic vehicles are all included in describing automation. Cuevas, et al. (2007) state that effective team collaboration in highly technological environments requires a greater focus on team cognition, in the context of both human-human and human-automation team dynamics. Coordinated behavior is the result of team cognition and emerges from the relationship of a team member's individual cognition and their team process behavior.

A human-automation team is defined as, the dynamic, interdependent coupling between one or more human operators and one or more automated systems requiring collaboration and coordination to achieve successful task completion (Cuevas, et al., 2007). Factors such as psychological, cognitive, social, situational, and system design affect the relationship of individual team members and automation technology. Human-machine interactions that require high levels of automation, transform automation into a vital member of the team that can greatly affect the decision making process (Cuevas, et al., 2007).

1. Framework for Augmenting Team Cognition with Automation Technology

Cuevas et al. (2007) have developed a theoretical framework to illustrate the design and implementation of automation technology and how it influences team cognition and the decision making process in complex operational environments. The goals of the framework were to "illustrate the mitigating effects of stressors on cognitive processes, show the relation of team processes to team behaviors, and finally to indicate where automation may most efficaciously scaffold team cognition and support team decision making (Cuevas, et al., 2007, p. 2)". The framework emphasizes how increasing human automation team cognition entails the comprehension of how task related factors

interrelate with team member's cognitive and metacognitive processes to influence critical team behaviors. The framework is illustrated in Figure 10.

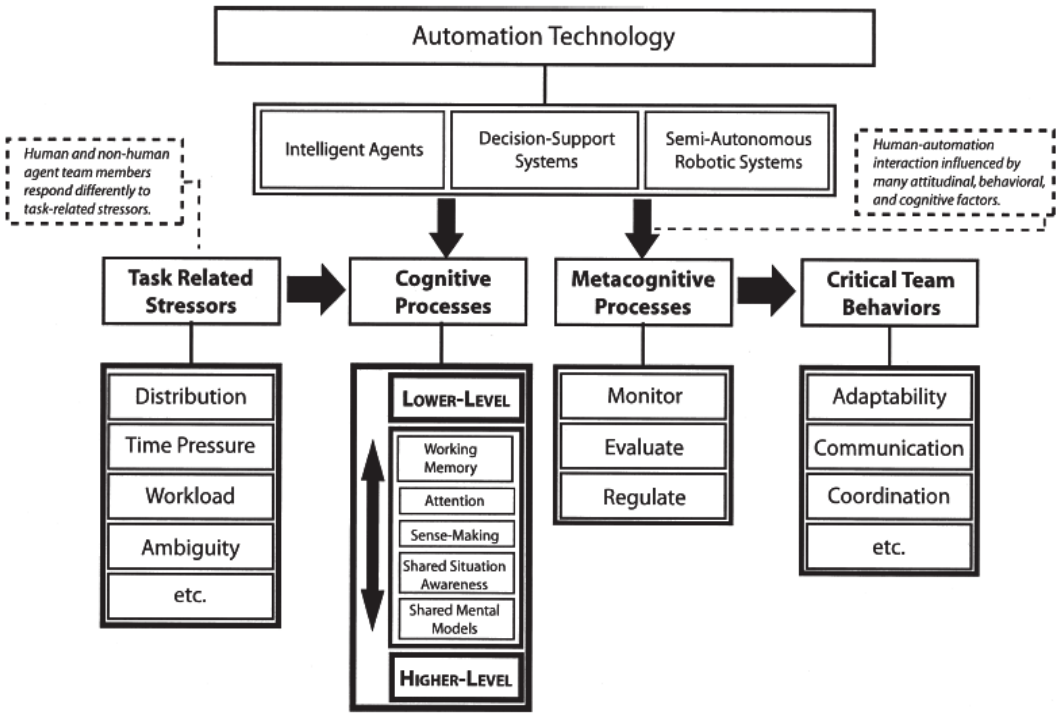

Figure 10. Theoretical Framework for Augmenting Team Cognition with Automation Technology (From: Cuevas, et al., 2007).

To improve the framework, attitudinal factors that mold the human-automation relationship were studied, in specific team member's attitudes towards automation. Levels of trust amongst the human operators of the automation technology ultimately influence the operator's over-reliance and therefore complacency of the automated system or the under-reliance and hence mistrust of the automated system.

Results indicated how attitudes of human operators can negatively affect human-automation interaction in complex operational situations. While on average, participants of the study had neutral attitudes toward automation, findings in the study revealed concerns over the effect of automation on skill proficiency and communication overhead could reduce the user's preference for using automation in completing their tasks.

C. COLLABORATION

1. Collaborative Capacity

Thomas, Hocevar, and Jansen (2006) define collaborative capacity as, "the ability of organizations to enter into, develop, and sustain inter-organizational systems in pursuit of collective outcomes (Thomas, et al., 2006, p. 2)." The ability of agencies to collaborate improves their ability to achieve all tasks assigned and also to gain from the additional resources other collaborators can bring to the mission. These resources include (Thomas, et al., 2006): (1) cost savings through the transfer of small practices; (2) better decision making as a result of advice and information obtained from colleagues; (3) enhanced capacity for collective action by dispersed units; (4) innovation through the cross pollination of ideas; and (5) recombination of scarce resources.

Co-dependency between organizations is a factor that requires collaboration in order for these organizations to be successful. Although the benefits of collaboration are apparent to the accomplishment of the mission, Thomas et al. point out that organizations usually fail at building these collaborative relationships. They state that the reasons for these failures are attributed to: (1) diverse missions; (2) goals and incentives that conflict with one another; (3) histories of distrust; (4) leader's lack of ability to collaborate; and (5) the limitation of coordinating systems needed to support collaborative efforts.

In contrast, in successful collaborating organizations, some of the success in collaboration is attributed to: (1) pursuit of a common objective/goal; (2) organizations are flexible to the interest of other collaborating organizations; (3) leadership support to collaboration; (4) appreciation of other's perspectives; (5) trust; and (6) effective communication and information exchange.

a. Model of Collaborative Capacity

Thomas et al. (2006) developed a structure that illustrates the conditions for effective interagency collaboration. In the model two interdependent organizations with a common goal are facing a problem. Arrows in the model illustrate interaction between organizations which aid in collaboration to meet the common goal as shown in Figure 11. These interactions occur in three domains.

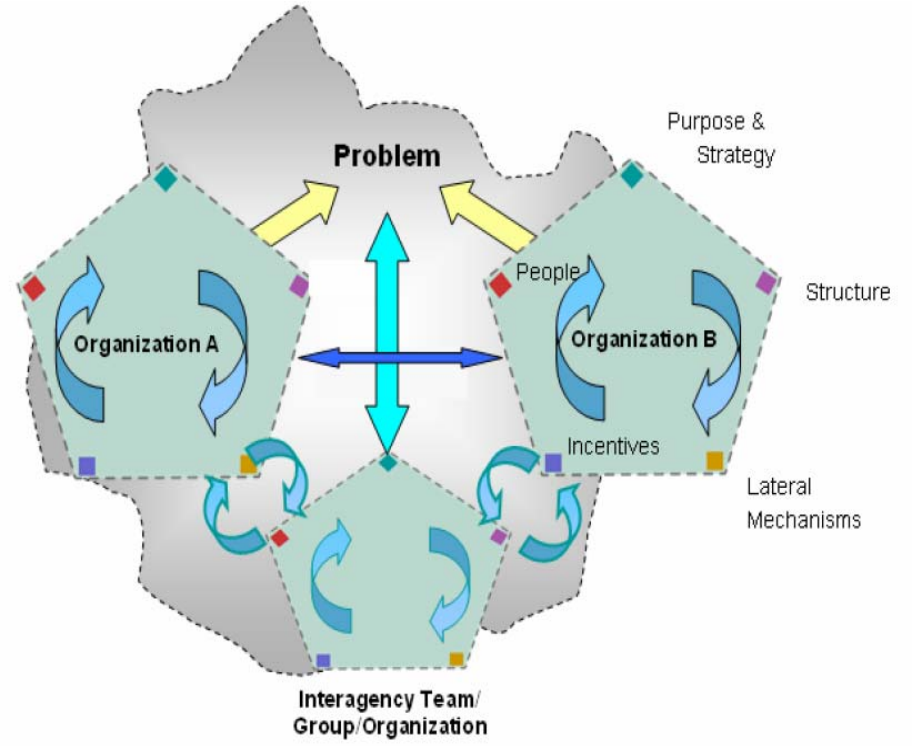

Figure 11. Model of Collaborative Capacity (From: Thomas, et al., 2006).

In the first domain the five system design categories (strategy, structure, incentives, lateral mechanisms, and people) for each organization must be aligned with each other and the external issue at hand. The arrows within each of the pentagons illustrate this point. In the second domain the system elements must also be aligned across organizations. In the final third domain developing of interaction is needed so that, "design characteristics of the interagency task force or team are not only internally consistent, but also are aligned with the primary organizations they represent (Hocevar, Thomas, & Jansen, 2006, in Thomas, et al., 2006, p. 10.)"

2. Collaborative Critical Thinking

Research suggests that individuals succeed in uncertain and dynamic settings in part by thinking critically about the situation they're facing. Collaborative critical thinking is the process by which team members work as a team to apply critical thinking to the group level (Hess, Freeman, Coovert, 2008). *Collaborative critical thinking* is further defined as "the interaction between team members that manages uncertainty by

revealing it, identifying its sources and devising ways to test its depths or diminish it (Hess, et al., 2008, p. 241)." The ability to handle uncertainty improves risk estimates so that plans can be verified, decrease their chance of failure, or not used at all.

Collaborative critical thinking has four unique interactions that each team member takes part in (Hess, et al., 2008): (1) monitoring interactions that warn other team members that uncertainty exists; (2) assessment interactions in which opportunity and the need to resolve the uncertainty are assessed by team members; (3) critiquing interactions where members of the team identify the source of uncertainty, conflicting interpretations of the evidence at hand, and untested assumptions that shape the inferences from explicit knowledge; and (4) devising actions that decrease uncertainty or compensate for irresolvable uncertainty.

Any uncertainty faced by a team can be handled by collaborative critical thinking, but it is most usually applied to the specific mission at hand, and the team processes in achieving the mission. Mission focus entails critiquing evaluations and plans that are imperative for the success of the mission. Team processes are focused on the critique of the goals and plans for achieving the goal (Hess, et al., 2008).

Hess et al. (2008) suggests that collaborative critical thinking is not a process for novices but through training is a process that can be acquired. This was demonstrated by research in which teams were trained to reduce uncertainty about future goals and this resulted in improved team performance and mission success.

Collaborative critical thinking is a cyclical process. Each action results in a modification of the state of the perceived environment and in so doing reducing warnings to the presence of uncertainty. The purpose of the assessment process is to determine when to devote team effort in critiques, and when to act right away. Hence assessment is a function that accommodates quick, recognitional decision making on the short path, and more calculated analytic decision making on the other (Hess, et al., 2008).

a. CENTER

To measure the state of knowledge and judgments about knowledge within teams, Hess et al., (2008) have designed a software system to enhance team member's collective knowledge and decisions by enhancing collaborative critical thinking. This software system, known as CENTER, enables leaders to query team members in relation to the state of mission knowledge and decision. CENTER also elicits brief responses and statistically summarizes them. Finally CENTER displays these responses to leaders and recommends the issues on which leaders and team members should focus their attention.

Through CENTER decision makers can monitor the organization's state of collaborative critical thinking with respect to mission-specific issues (Hess, et al., 2008). The software also aids leaders in understanding measures of collaborative critical thinking and actions to enhace it by evaluating distribution patterns in each response and displaying this guidance to the decision maker.

Insights into the use and interpretation of information can help ease of accessibility of knowledge state. CENTER helps in the integration of data and social systems and thus it can become a very helpful technology in distributed organizations (Hess, et al., 2008).

3. Collaboration Technologies in Distributed Teams

Degradation of social and contextual cues have increased military and business team's susceptibility to time constraints and poor decision making (Rentsch, Delise, Hutchison, 2008). As an example of this Rentsch et al. (2008) describe how distributed team members use up more of their time discussing information held in common by several team members when compared to the time spent on discussion of unique, expert information held by individual team members. This type of information management is made worse when teams have temporal pressure, which is linked with inhibited sharing of unique information, likelihood of failure in achieving team consensus, and reduced decision quality. Moreover, the addition of a high cognitive load to temporal pressure can reduce the sharing of unique information and result in sub-standard task performance (Rentsch, et al., 2008).

It is therefore essential to understand the correlation of cognitive processes and collaborative decision making and problem solving as it is a basis for the evolution of collaborative technologies. Future effective technology should concentrate on helping teams take advantage of the knowledge held by individual team members and therefore develop new task knowledge that could be critical in complex team problem solving (Rentsch, et al., 2008).

Current technology used in communication is deficient and limits the development of cognitive similarity (e.g. mutual knowledge, shared understanding, shared goals) in distributed teams (Rentsch, et al., 2008). A distributed team is defined as:

> A boundaryless network organization form where a temporary team is assembled on an as-needed basis for the duration of the task and staffed by members who are separated by geographic distance and who use computer mediated communications as their primary form of communication and interpersonal contact (Kelsey, 1999, p. 104).

Cognitive similarity between teams is associated with improved team functioning. Studies find that cognitive similarity also reduces differences between distributed and co-located teams as a result of team members knowing each other prior to working together. Although Rentsch et al. (2008) also point out that due to the obstacles to effective communications in distributed teams, team members may take longer relative to co-located teams to develop cognitive similarity.

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IV. STRUCTURAL MODEL OF TEAM COLLABORATION

A. FOCUS AND STAGES OF THE MODEL

In 2003 a model of team collaboration was developed by Warner, Letsky, and Cowen. The model concentrated on the cognitive aspects of a team's collaboration process and focused on three operational tasks: team decision making, developing a shared understanding, and intelligence analysis (Warner, Letsky, & Cowen, 2005). The original model contained four interdependent stages of team collaboration, which were: (*1) knowledge construction; (2) collaborative team problem solving; (3) team consensus;* and *4) outcome evaluation and revision.*

Model components included in the original model of team collaboration include: *inputs to the model*, *collaboration stages and cognitive processes*, and *model outputs* (Warner, et al., 2005). *Inputs to the model* are defined as general information needed by teams before they collaborate on a problem. Information can include a description of the problem, team member's expertise, structure of the organization, responsibilities of team members, resources, supporting technology, and information accuracy.

The initial model included four interdependent stages with a feedback loop from the *outcome evaluation and revision* stage to the *collaborative team problem solving* phase for revising team solutions. The model has evolved such that the four stages were modified with a new stage added by splitting the *knowledge construction* phase into *individual knowledge building* and *team knowledge building.* The new five interdependent stages are: (*1) individual knowledge building*; (*2) team knowledge building;* (*3) developing shared problem conceptualization; (4) team consensus development*; and *(5) outcome appraisal.*

These stages are not necessarily sequential and collaborating teams may be found alternating between stages as they progress to a team solution (Warner, et al., 2005). The focus of the model is on the cognitive processes and their definitions that describe team collaboration. These cognitive stages, and associated cognitive processes along with their definitions are found in Table 2.

Finally, the model output component is the result the team has produced from the collaboration process. Results from the collaboration process include: course of action, recommendations, assessments, product, opinion, and guidelines (Warner, et al., 2005). The result of the collaboration process will depend on the situation or scenario the team was collaborating on.

Table 2. Operational Definitions for CKI Macrocognitive Processes (From: Warner, Letsky, & Cowen, 2005).

Cognitive Process Definitions	
	PHASE I : INDIVIDUAL KNOWLEDGE BUILDING STAGE: Individual team members ask for clarification of data or information, or respond to clarification requested by other team members. The more clarification or response to clarification the more individual knowledge that is built.
1.	**Iterative Information Collection**: *collecting* and *analyzing* information to come up with a solution but no specific solution mentioned.
2.	**Individual Task Knowledge Development:** individual team member asking for clarification to data or information about the task; or response to clarification about the task.
3.	**Individual Mental Model Development:** individual team member using available information to increase his/her knowledge representation of the problem situation.
	PHASE II: TEAM KNOWLEDGE BUILDING STAGE: All team members participate in clarifying information (e.g. answering a question) to build team knowledge. The greater the number of clarifications, the more team knowledge that is built.
4.	**Pattern Recognition and Trend Analysis:** *Number* of patterns communicated among team members; the *time to detect* those patterns and *accuracy* of the patterns.

5.	**Team Mental Model Development:** the increasing similarity between an individual's knowledge representation and the team's knowledge representation through the process of individual team members convincing other team members to accept specific data, information or knowledge.
6.	**Recognition of Expertise:** calculated by comparing an individual's perceptions of fellow members expertise with actual individual level metrics of expertise. This individual level metric of recognition of expertise can be aggregated to the team level by averaging the individual scores of the team. The closer the actual and perceived rankings, the better the team is at recognizing expertise.
7.	**Sharing Unique Knowledge:** is an exchange process where any information uniquely held by an individual is made available to all other group members and the group uses this information in their option selection process. The greater the number of unique information items that become available to the group, the greater the shared unique knowledge.
8.	**Uncertainty Resolution:** The progressive minimization of sources of uncertainty in a decision environment. The greater the number of uncertainty sources that are reduced, the higher the uncertainty resolution.
9.	**Knowledge Interoperability:** defined as the process of individual team member's exchanging their knowledge of the problem situation such that agreement is reached among team members with respect to a common understanding of the topic's meaning.
	PHASE III: DEVELOPING SHARED PROBLEM CONCEPTUALIZATION STAGE: team members sharing their understanding of problem goals, characteristics of the environment and rules for operating for generation of quality problem solutions. The greater the sharing of the above information, the greater the team level understanding of the problem.

10.	**Visualization and Representation of Meaning:** *visualization* is where individual team members use methods such as graphs and pictures to transfer meaning to other team members. *Representation* is where individual team members use methods such as note pads to sort data and information into meaningful chunks.
11.	**Building Common Ground**: common ground equals the amount of redundant terms (x) emerging within the group activity over the total number of words (n) generated by the group (i.e., cg = x/n; whereas the lower the number the greater the common ground among the team)
12.	**Knowledge Sharing:** the number of pieces of *information* passed to another team member. The amount of knowledge shared between two team members is equal to the number of pieces of information given by one team member divided by the amount of new knowledge gained from the second team member (measure by pre/post session questionnaire). The smaller the ratio (items/new knowledge), the greater the knowledge shared.
13.	**Knowledge Transfer:** The act of exchanging useful, actionable *knowledge* among team members. The more actionable knowledge exchanged, the more knowledge transferred. *Knowledge* represents a pattern that connects and generally provides a high level of predictability as what is described or what will happen next. The greater the number of exchanges, the more knowledge that is shared.
14.	**Team Shared Understanding:** discussion among all team members on a particular topic or data item (i.e., discussion does not involve answering questions).
	PHASE IV: TEAM CONSENSUS DEVELOPMENT STAGE: Team negotiation of a solution option and collective agreement by team members on a particular option (i.e., each team member does not have to agree on the solution option but as a team they need to agree on the option).

15.	**Critical Thinking:** Critical thinking impacts decision processes and outcomes and can be indirectly measured through these (measures include # of issues considered in an assessment, # of conflicting pieces of evidence identified, # of explanations of conflict generated, # of alternative assessment generated, accuracy of assessment (agreement with SME), consensus on assessment, confidence in assessment, frequency of contingency planning, subjective evaluations of process. Higher scores on these metrics indicate better critical thinking.
16.	**Mental Simulation:** Individual team members or the whole team using their mental models (i.e., individual or team respectively) to run a mental simulation of what might happen over time. Pattern matching between features of the current situation and those of previous similar situations in order to base projections on the outcomes of the current situations. Measures of mental simulation *content* could include pre/post session questionnaires, and concept maps; mental model *occurrence* measures could include detection of communication utterances describing comparisons to similar problems and projections about current problem.
17.	**Intuitive Decision Making:** the number of team decisions derived by the team members recognizing the situation as typical, so they immediately know what course of action they will do. They immediately know the goals, priorities and the steps of the course of action in the given situation.
18.	**Iterative Information Collection**: *collecting* and *analyzing* information to come up with a solution but no specific solution mentioned.
19.	**Solution Option Generation:** generating reasonable alternatives in a decision problem that satisfy the list of requirements.
20.	**Storyboarding:** the process of visual thinking and planning, which allows a team to brainstorm together along with placing and arranging their ideas on cards before taking action. Measures for effective storyboarding include counting

	the number of cards necessary for explaining a concept or idea, evaluate the coherence of the plan by investigating the smoothness of topic shifts and time jumps among individual threads and evaluate whether the storyboard has enough content to sufficiently describe the plan.
21.	**Team Pattern Recognition and Trend Analysis:** *Number* of patterns communicated among team members; the *time to detect* those patterns and *accuracy* of the patterns.
22.	**Team Negotiation of Solution Alternatives:** team negotiation is defined as the number of changes of solution alternatives by the total team divided by the total time to reach agreement. The larger the ratio, the more effective the negotiation.
	PHASE V: OUTCOME APPRAISAL STAGE: team evaluation of selected solution option against problem solving goal. Team revises solution option if option does not meet goal.
23.	**Feedback Interpretation:** the whole team discusses the selected solution option against meeting the problem goal resulting in either completely meeting the goal or areas that need to be discussed further.
24.	**Replanning:** replanning can be measured by counting the number of changes made to the *initial* plan until final plan is achieved. Note: initial plan is defined as the preliminary course of action developed by the team. All behavior leading up to the initial plan is not included in the replanning measure.
25.	**Team Pattern Recognition and Trend Analysis:** *Number* of patterns communicated among team members; the *time to detect* those patterns and *accuracy* of the patterns.
	ADDED MACRO-COGNITIVE PROCESSES
26.	**Decision to Take Action:** the act of issuing an action (coa) or a request to take action (rta).

27.	**Miscellaneous:** these codes do not fall into any of the 26 macro-cognitive categories.

B. FAA AND NEADS THROUGH THE COGNITIVE STAGES

As the FAA and NEADS team collaborated to find solutions to the attacks of September 11, 2001, they were also progressing through the stages in the structural model of team collaboration. The following paragraphs describe how the FAA and NEADS teams collaborated were involved in each of the five phases of the model.

1. Individual Knowledge Building Stage

In the first stage of the structural model of team collaboration, *individual knowledge building*, each individual works to attain all pertinent information and develop their situational awareness. To develop this individual knowledge team members ask questions and request clarification from other team members. As individual knowledge is built the team as a whole becomes more aware of the situation and can move to the team knowledge building stage.

As the initial lines in the transcript show, NEADS personnel were gathering information to determine what type of situation they were facing. Questions such as type of aircraft, their call sign, and location were part of developing the situational awareness of NEADS personnel. Table 3 shows an example of the individual knowledge building stage, where Sgt. Watson from NEADS, is asking for clarification from Boston Center to build individual knowledge and build his mental model.

Code	Speaker	Communication
Suk	Sgt Watson	Yes, Hunters calling in reference to the highjack.
Itk	Boston Center	Yes?
Itk	Sgt Watson	We're checking to get some information from you if we could?
Itk	Boston Center	OK, what do you need?
Itk	Sgt Watson	We need call signs, type aircraft?
Itk	Boston Center	It's American 11
Itk	Sgt Watson	American 11?
Itk	Boston Center	Type aircraft is a 767
Itk	Sgt Watson	And…??'s number, do you know that?
Itk/Itk/ Itk	Boston Center	Um, I don't know…hold on. Hey Dan? Do you got souls on and all that information? (we don't have any) No we don't have any of that information.
Itk	Sgt Watson	You don't have any of that?
Itk	Boston Center	?? location's about 40 miles North of Kennedy
Itk	Sgt Watson	40 miles north of Kennedy?
Itk	Boston Center	Right.
Itk	Sgt Watson	Do you have a mode 3?
Itk	Boston Center	No we don't he's a primary target only
Itk	Sgt Watson	Primary target only?
Itk	Boston Center	Yup
Itk	Sgt Watson	OK and you don't know where he's coming from or his destination?
Itk	Boston Center	No idea. He took off out of Boston originally heading for Los Angeles.

Table 3. Excerpt from NORAD / FAA Team Collaboration on September 11, 2001; Example of Individual Knowledge Building Stage.

2. Team Knowledge Building Stage

As individual situational awareness is increased team members are able to clarify information to build team knowledge. This stage was accomplished by the agencies when they established radio communication between the participating agencies as well as the aircraft in their area of responsibility. The FAA air traffic control personnel established communications with NEADS, who communicated with the Continental United States NORAD region who communicated with NORAD headquarters. In listening to the hijacked aircraft and watching the events that unfolded during 9/11 the air traffic controllers formed their mental models: There were hijacked aircraft, and they were being used as missiles to destroy American landmarks. Air traffic controllers relayed this information back to NEADS. The NEADS operation center pieced together

these individual mental models to form the larger mental model, which was our country was under attack. Throughout the entire evolution NEADS and FAA air traffic controllers switched back and forth between the *individual knowledge building phase* and *team knowledge building phase* since team members were participating in clarifying information to build team knowledge. An example of the team knowledge building stage from the transcript was observed when Boston Military informed Sgt Watson at NEADS that one of the aircraft was not in radio contact. This example is provided in Table 4.

Table 4. Excerpt from NORAD / FAA Team Collaboration on September 11, 2001; Example of Team Knowledge Building Stage.

Code	Speaker	Communication
Suk	Boston Mil	United Airlines dispatch says what they know is united 175 is at this time the aircraft is nordo, not in radio contact
Itk	Sgt Watson	nordo?
Itk	Boston Mil	that is correct
Itk/Suk/ Ms	Sgt Watson	Is it still airborne sir because we have possible confirmation that this is another highjacked aircraft that could crash into the world trade center
Ki/Itk/ Ki	Boston Mil	we don't not know if he's airborne right now, we're trying to research it, he's in New York airspace
Itk	Sgt Watson	you get a tail number?
Itk	Boston Mil	no I don't have that information

Although much criticism has been made regarding interagency collaboration after the September 11 attacks, according to the 9/11 Commission Report, the events as they unfolded that morning and response by the participating agencies did not reflect discredit on the operational personnel at NEADS or FAA facilities. NEADS commanders and officers sought out information and FAA controllers, facility managers, and command center managers thought outside the box in recommending a nationwide alert, in ground-stopping local traffic, and in deciding to land all aircraft.

In the confusion of the September 11 attacks, many false reports were made that contributed to the development of erroneous mental models by decision makers. There were reports of planes with bombs onboard which were untrue. The addition of this erroneous information delayed decision making in a time crucial environment. Clarifying

information and determining its accuracy are critical steps in building team knowledge and essential to provide pertinent information to the decision makers.

3. Developing Shared Problem Conceptualization Stage

By sharing their understanding of the problem and characteristics of the environment team members can generate quality problem solutions as defined in the *developing shared problem conceptualization phase*. It is evident throughout the NEADS / FAA transcripts that team members were proactive in sharing information and their understanding of the problem to generate problem solutions as in the following example in Table 5, where an unidentified speaker develops a solution to find information on the aircraft without the aircraft's mode three.

Table 5. Excerpt from NORAD / FAA Team Collaboration on September 11, 2001; Example of Developing Shared Problem Conceptualization.

Code	Speaker	Communication
Itk	Sgt Watson	Ok all we're asking is your mode 3…your mode 3. Did you assign any mode 3 to that aircraft?
Itk	Boston Center	uuum, original was uh…hold on
Imm	Sgt Watson	we still should be able to get it without 53
Ki	Boston Center	you have to file it, you have to file a 3
Suk	Boston Center	Uh, we don't have any mode 3 right now,
Itk	Sgt Watson	nothing, you guys…
Prta	Boston Center	hes a primary target only, um I don't even know what his original..I could try and find his original mode 3
Itk	Sgt Watson	yeah that's all we need
Misc	Boston Center	hold on
**Ki/Ur*	Sgt Watson	they don't know yet
**Ki/Ur*	Sgt Watson	they don't know, they don't have a mode 3
Misc	Sgt Watson	He's gonna try to give us…
Itk	Boston Center	can't you even fly him with a mode 3 though? ?? says American 11
Ki	Sgt Watson	He uh, he's having a rough time talking cause he's making threats in the cockpit
Sog/Itk	H4	you know what I have an idea. ask him if he's got anybody like near the aircraft that's got stats on him, ??? maybe he can find out where the hell he's by

Due to the unique nature of the attacks the generation of quality solutions was not immediately apparent in the communications between the agencies because they were not

trained to handle the events as they unfolded. Before the September 11 attack, standard operating procedure did not train or prepare the NEADS / FAA personnel for handling hijacked aircraft used as missiles intoU.S. landmarks. Generating problem solutions occurred over time and after it was apparent that the country was under attack. Using existing protocol, the FAA along with the NORAD chain of command, recommended a nationwide alert and decided to land all aircraft.

4. Team Consensus Development Stage

In the team consensus development stage team members negotiate a solution and collectively agree on a particular option. An example of the transcripts that demonstrates this stage is depicted in Table 6.

Table 6. Excerpt from NORAD / FAA Team Collaboration on September 11, 2001; Example of Team Consensus Development.

Code	Speaker	Communication
Ki/ Idm/ Kt	Scoggins - Bost Mil	how you doing.. Nobody is departing Boston in all airspace Boston center, we shut all aircrafts down, rerouting New York metro airports, our only concern is that there are aircrafts in the sky and in case any more of the divert, before they start turning or whatever their gonna do, we were just wondering do you have people on alert
Suk	NEADS	I got predators in whiskey 105 right now, I have a tanker as well, I got other aircraft on alert down at Langley, and I have trackers over JFK, over Boston and in that area right now, just looking for anything suspicious
Ki	Scoggins - Bost Mil	anything suspicious ok, and we'll let you know about the internationals, we're not sure what were doing with them anymore at this time
Itk	NEADS	Ok, so JFK and Boston are shut down correct?
Itk/ Suk	Scoggins - Bost Mil	We've shut down Boston, I'm not sure if New York center is done, any aircraft at this time in New York we are rerouting to somewhere else

5. Outcome Appraisal Stage

Due to the unique nature of the attacks, the decision to shoot down suspected hijacked aircraft could only be given by the president (Bronner, 2006). By the time the

President had ordered the shooting of hijacked aircraft all hijacked planes had crashed. No examples of the outcome appraisal stage were found in the NEADS / FAA channel four transcripts. This was due to the fact that this was the identification channel used mainly for information exchange between the agencies. Most solution option generation examples would have been discussed in channel 2 (mission crew commander channel) of the NEADS / FAA transcripts.

The 9/11 Commission concluded that NEADS commanders and officers actively sought out information, and made the best judgments they could on the basis of what they knew. Individual FAA controllers, facility managers, and Command Center managers thought outside the box in recommending a nationwide alert, in ground-stopping local traffic, and, ultimately, in deciding to land all aircraft and executing that unprecedented order flawlessly (National Commission on Terrorist Attacks upon the United States, 2004).

V. METHODS

A. CHOICE OF NEADS AUDIO CHANNEL

The CD containing the recordings of the 24 channels was requested from NORAD. The NORAD public affairs officer mailed two full CDs containing the 24 channels recorded by NORAD on September 11, 2001. Each channel ranges in time from about 4.5 hours to 6.5 hours of NEADS and FAA communications during the September 11, 2001 attacks. All calls for help and calls to notify NORAD of the hijackings were made by FAA air traffic control personnel via NEADS and were recorded on channel 4.

1. Coding Practice Between Raters

The thesis researcher initially practiced coding using a separate transcript to become familiar with the definitions of the cognitive processes in the model of team collaboration. To familiarize each coder with the coding process the coders coded one hundred lines from another experiment transcript. The two coders and other thesis advisor then reviewed the coding and discussed how and when each cognitive process definition should be used. In addition to this coding practice the two coders also coded one hundred lines of the NEADS / FAA channel four transcripts to further synchronize their application of the definitions of the macrocognitive processes for the coding process.

B. COMMUNICATION CODING FOR THE NORAD/FAA TRANSCRIPTS

The NORAD/FAA channel four transcript was analyzed using the definitions for the revised macrocognitive processes included in the model of team collaboration as seen in Table 2. Each speech turn was coded to indicate the speaker's cognitive process. Communication turns could be coded with one cognitive process or multiple cognitive processes if the speech turn contained several statements with separate cognitive processes employed.

C. ADDITION OF COGNITIVE PROCESS CODES AND MODIFYING DEFINITIONS

Discussions during practice coding reflected the need to make some additions and modifications to the codes. Because the revised set of macrocognitive processes included in the model of team collaboration have been updated since June 2007, some appeared to be more applicable to a controlled laboratory environment, thus some changes were needed to reflect the type of data produced from a real-world event. It was observed throughout the coding process that although these cognitive codes were meant for laboratory settings the name of the macrocognitive process sounded like a process that applied to the team communications we were coding. These cognitive processes that seem more germane to laboratory settings can be adapted to be used in real-world scenarios as described below.

Under the cognitive category of *team knowledge building*, a change was made to the definition *Recognition of Expertise (RE).* The original definition is "calculated by comparing an individual's perceptions of fellow members expertise with actual individual level metrics of expertise." For our use in coding the NORAD / FAA team collaboration, *RE* was changed to indicate team members recognition of expertise of other team members as depicted in the following example:

> *-Maj Prodder…this guy wants to talk to you so he can tell these pilots what you want them to do.*

In the example above, MAJ Prodder is recognized as the expert in instructing the pilots on their course of action. Therefore the code assigned to his speech turn would be *RE*. Recognition of expertise was then slightly modified to illustrate recognition of expertise by an individual team member.

Another definition of a macrocognitive process that appears more germane for laboratory experiments was *building common ground (bcg)* under the team collaboration model phase *developing shared problem conceptualization.* The definition requires a calculation described as dividing the number of redundant terms used within the group by the total number of words spoken during the event. It was observed throughout the

transcript that the team as a whole did build common ground in reaching their objectives as depicted in the following example where the team is attempting to identify tracks by their call signs and type of aircraft:

> *- hi this is hunters, we have one across from you guys, if you have any tracks over to the northeast, we just want to know who they are by call signs and type aircraft.*

The speaker in the example above is discussing with another team member the identification of tracks and that he would like to know what they are by call sign. Passing this information to another team member is important in developing situational awareness amongst the team and in doing so builds common ground between the team.

The addition of the cognitive category *decision to take action* was implemented which includes issuing a *course of action (COA)* and *request take action (RTA)* based on research by Hutchins, Kendall, & Bordetsky (2008). A *course of action* was defined as a required immediate task ordered by a superior or a team member. Request take action was not considered immediate or an order but more of a request between team members.

D. MEASURING INTER-RATER RELIABILITY

For the final coding, each coder coded 1221 lines of code individually. Once the individual coding was completed, the coders and the thesis advisor met to discuss each speech turn and discuss the results of each individual coder. When the coders agreed on the code applied to a speech turn no action was taken. When coders disagreed a discussion followed where each coder would explain the reasoning behind their chosen code. Coders would then reassess their coding and either agree or disagree. In the instance of disagreement the code for that speech turn was marked with an asterisk indicating that no agreement was reached (NAR) between coders.

The NEADS / FAA channel four transcripts are found in Appendix A. Yellow color box codes indicate that there was an initial disagreement between coders as to the appropriate coding of the communication turn. The code highlighted in yellow was the final code agreed upon by the two coders. Red color box codes indicate there was disagreement between coders and no final agreement was reached. These red color codes are also marked with an asterisk.

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VI. RESULTS

A. TRANSCRIPT CODING RESULTS

1. Percentages and Usage of Cognitive Processes

Coding results for the communication turns of NEADS and FAA air traffic center personnel on September 11, 2001, indicate that 20 of the 27 (74%) cognitive processes included in the model of team collaboration were used. Seven macrocognitive processes were not used to code the channel four transcript; these were: *knowledge sharing (ks), critical thinking (ct), iterative information collection (iic2)* for team consensus development, *team pattern recognition and trend analysis (tprta), team negotiation of solution alternatives (tnsa), feedback interpretation (fi), and team pattern recognition and trend analysis (tprta2)* for outcome appraisal. Examples of the speech turns that were coded as representing the cognitive processes of the NEADS / FAA channel 4 transcripts are included in Table 7.

Table 7. Cognitive Processes Examples found in the NEADS / FAA Channel 4 Transcripts.

Cognitive Process Definitions (From Warner, Letsky, & Cowen, 2005) and Examples from NEADS / FAA Channel 4 Transcripts on September 11, 2001.	
	PHASE I: INDIVIDUAL KNOWLEDGE BUILDING STAGE: Individual team members ask for clarification of data or information, or respond to clarification requested by other team members. The more clarification or response to clarification the more individual knowledge that is built.
1.	**Iterative Information Collection**: *collecting* and *analyzing* information to come up with a solution but no specific solution mentioned. *-Unknown rider, unknown rider, authenticate 283 s kilo.* *-they're not answering.* *-unknown rider, at position…*

	-they are not authenticating.
2.	**Individual Task Knowledge Development:** individual team member asking for clarification to data or information about the task; or response to clarification about the task. *- Do you have the last known position of American 77?* *-yes* *-could I have it?* *-yes, YRK080 at 010* *-and is there a lat long sir?* *- I don't have a lat long right here…do you want an approximate location* *-yeah.* *-it would be Henderson.*
3.	**Individual Mental Model Development:** individual team member using available information to increase his/her knowledge representation of the problem situation. *-They're probably not squawking anything anyway. I mean, obviously these guys are in the cockpit.* *-these guys are smart.* *-yeah, they knew exactly what they wanted to do.*
	PHASE II: TEAM KNOWLEDGE BUILDING STAGE: All team members participate in clarifying information (e.g. answering a question) to build team knowledge. The greater the number of clarifications, the more team knowledge that is built.
4.	**Pattern Recognition and Trend Analysis:** *Number* of patterns communicated among team members; the *time to detect* those patterns and *accuracy* of the patterns. *-he's a primary target only, um I don't even know what his original…*

	-I could try and find his original mode 3.
5.	**Team Mental Model Development:** the increasing similarity between an individual's knowledge representation and the team's knowledge representation through the process of individual team members convincing other team members to accept specific data, information or knowledge. *- Boston was telling me its in your airspace that's why I'm calling.*
6.	**Recognition of Expertise:** calculated by comparing an individual's perceptions of fellow members expertise with actual individual level metrics of expertise. This individual level metric of recognition of expertise can be aggregated to the team level by averaging the individual scores of the team. The closer the actual and perceived rankings, the better the team is at recognizing expertise. *-Maj Prodder…this guy wants to talk to you so he can tell these pilots what you want them to do.*
7.	**Sharing Unique Knowledge:** is an exchange process where any information uniquely held by an individual is made available to all other group members and the group uses this information in their option selection process. The greater the number of unique information items that become available to the group, the greater the shared unique knowledge. *-I got predators in whiskey 105 right now, I have a tanker as well, I got other aircraft on alert down at Langley, and I have trackers over JFK, over Boston and in that area right now, just looking for anything suspicious.*
8.	**Uncertainty Resolution:** The progressive minimization of sources of uncertainty in a decision environment. The greater the number of uncertainty sources that are reduced, the higher the uncertainty resolution. *-They don't know yet* *-They don't know, they don't have a mode 3.* *-His original code was 1443.*

	*-1443, copy that sir***.**
9.	**Knowledge Interoperability:** defined as the process of individual team member's exchanging their knowledge of the problem situation such that agreement is reached among team members with respect to a common understanding of the topic's meaning. *-Ok, there is 3 aircraft missing out of Boston, spoke with Boston and they said they're not sure of the third aircraft call sign but they do have two, one of them is United 175 and one is American 11.* *- There were threats in the cockpit being made, this is the initial highjack information that we got American 11, Boston to Los Angeles proposed route, he was headed towards JFK at the time that they lost contact but that was not the aircraft headed into the world trade center that hit it.*
	PHASE III: DEVELOPING SHARED PROBLEM CONCEPTUALIZATION STAGE: team members sharing their understanding of problem goals, characteristics of the environment and rules for operating for generation of quality problem solutions. The greater the sharing of the above information, the greater the team level understanding of the problem.
10.	**Visualization and Representation of Meaning:** *visualization* is where individual team members use methods such as graphs and pictures to transfer meaning to other team members. *Representation* is where individual team members use methods such as note pads to sort data and information into meaningful chunks. *-Hey, did we get a tail number?* *-Right there (pointing to plot).* *-That's where she said it was; I don't see anybody going, what wait a minute…learn how to offset.* *- Hello…forgot how to offset…4-6 scrambled?...that v-point?*

11.	**Building Common Ground**: common ground equals the amount of redundant terms (x) emerging within the group activity over the total number of words (n) generated by the group (i.e., cg = x/n; whereas the lower the number the greater the common ground among the team) *- hi this is hunters, we have one across from you guys, if you have any tracks over to the northeast, we just want to know who they are by call signs and type aircraft.* *- if theres anything you need or anything I can help you with let me know where he is right now please.*
12.	**Knowledge Sharing:** the number of pieces of *information* passed to another team member. The amount of knowledge shared between two team members is equal to the number of pieces of information given by one team member divided by the amount of new knowledge gained from the second team member (measure by pre/post session questionnaire). The smaller the ratio (items/new knowledge), the greater the knowledge shared. *-No coded examples in transcripts*
13.	13) **Knowledge Transfer:** The act of exchanging useful, actionable *knowledge* among team members. The more actionable knowledge exchanged, the more knowledge transferred. *Knowledge* represents a pattern that connects and generally provides a high level of predictability as what is described or what will happen next. The greater the number of exchanges, the more knowledge that is shared. *- currently we have Delta 89, its a 767 out of Boston headed for Las Vegas, last known now a confirmed highjack on a mode 3 of 1304 and he is in your center.*
14.	**Team Shared Understanding:** discussion among all team members on a particular topic or data item (i.e., discussion does not involve answering questions). *-yea, ok I can have my senior director give you a call every time someone*

	goes in the air. *-I can give you a quick heads up though, I've got two, you know Misty Thunder Area*.
	PHASE IV: TEAM CONSENSUS DEVELOPMENT STAGE: Team negotiation of a solution option and collective agreement by team members on a particular option (i.e., each team member does not have to agree on the solution option but as a team they need to agree on the option).
15.	**Critical Thinking:** Critical thinking impacts decision processes and outcomes and can be indirectly measured through these (measures include # of issues considered in an assessment, # of conflicting pieces of evidence identified, # of explanations of conflict generated, # of alternative assessment generated, accuracy of assessment (agreement with SME), consensus on assessment, confidence in assessment, frequency of contingency planning, subjective evaluations of process. Higher scores on these metrics indicate better critical thinking. *-No coded examples in transcripts.*
16.	**Mental Simulation:** Individual team members or the whole team using their mental models (i.e., individual or team respectively) to run a mental simulation of what might happen over time. Pattern matching between features of the current situation and those of previous similar situations in order to base projections on the outcomes of the current situations. Measures of mental simulation *content* could include pre/post session questionnaires, and concept maps; mental model *occurrence* measures could include detection of communication utterances describing comparisons to similar problems and projections about current problem. *-is it still airborne sir because we have possible confirmation that this is another high-jacked aircraft that could crash into the world trade center.*
17.	**Intuitive Decision Making:** the number of team decisions derived by the

	team members recognizing the situation as typical, so they immediately know what course of action they will do. They immediately know the goals, priorities and the steps of the course of action in the given situation. *-O.K. American Airlines is still airborne-11, the first guy. He's heading towards Washington. O.K, I think we need to scramble Langley right now. And I'm-I'm gonna take the fighters from Otis and try to chase this guy down if I can find him.*
18.	**Iterative Information Collection**: *collecting* and *analyzing* information to come up with a solution but no specific solution mentioned. *-No coded examples in transcripts.*
19.	**Solution Option Generation:** generating reasonable alternatives in a decision problem that satisfy the list of requirements. *- you know what I have an idea. ask him if he's got anybody like near the aircraft that's got stats on him, ??? maybe he can find out where the hell he's by.*
20.	**Storyboarding:** the process of visual thinking and planning, which allows a team to brainstorm together along with placing and arranging their ideas on cards before taking action. Measures for effective storyboarding include counting the number of cards necessary for explaining a concept or idea, evaluate the coherence of the plan by investigating the smoothness of topic shifts and time jumps among individual threads and evaluate whether the storyboard has enough content to sufficiently describe the plan. *-ok its sketchy, but there's a 600 foot vessel with 1200 people onboard, foreign captain, mass onboard, as soon as the crash happened, this ship was sitting off shore for two days, came in and anchored 600 yards off the coast of Atlantic City and we've got Coast Guard vessels querying it, just to* *let you know we got Helos asking the Master questions on the radio, and that helicopter was initially manned for New York.*

21.	**Team Pattern Recognition and Trend Analysis:** *Number* of patterns communicated among team members; the *time to detect* those patterns and *accuracy* of the patterns. *-No coded examples in transcripts.*
22.	**Team Negotiation of Solution Alternatives:** team negotiation is defined as the number of changes of solution alternatives by the total team divided by the total time to reach agreement. The larger the ratio, the more effective the negotiation. *-No coded examples in transcripts.*
	PHASE V: OUTCOME APPRAISAL STAGE: team evaluation of selected solution option against problem solving goal. Team revises solution option if option does not meet goal.
23.	**Feedback Interpretation:** the whole team discusses the selected solution option against meeting the problem goal resulting in either completely meeting the goal or areas that need to be discussed further. *-No coded examples in transcripts.*
24.	**Replanning:** replanning can be measured by counting the number of changes made to the *initial* plan until final plan is achieved. Note: initial plan is defined as the preliminary course of action developed by the team. All behavior leading up to the initial plan is not included in the replanning measure. *-At flight level 350, however they lost radar with him, they lost contact with him, they lost everything and they don't have any idea where he is or what happened. So what we've done at the surrounding centers here is to look out for limited codes or primary targets, whatever the case may be.*
25.	**Team Pattern Recognition and Trend Analysis:** *Number* of patterns communicated among team members; the *time to detect* those patterns and

	accuracy of the patterns. *-No coded examples in transcripts.*
	ADDED MACRO-COGNITIVE PROCESSES
26.	**Decision to Take Action:** the act of issuing an action (coa) or a request to take action (rta). A *course of action* was defined as a required immediate task ordered by a superior or a team member. *Request take action* was not considered immediate or an order but more of a request between team members. *- Get those aircraft scrambled towards him! (coa)* *- ok, if you could do me a favor and have them call us (rta)*
27.	**Miscellaneous:** these codes do not fall into any of the 26 macrocognitive categories. *- Ok, go ahead.* *- Hold on one second.* *- Stand by one.* *- Thank you.* *- Roger!*

The cognitive process with the second largest percentage, 284 out of 1221 speech turns (23.3%), of the codes were miscellaneous. In the NEADS and FAA air traffic center communications this code is used to denote information that does not fall into any of the 26 cognitive categories. These communication turns usually include greetings to open a communications channel between the sender and addressee, acknowledgment of a received message, spoken personal emotions, and so on. Although these miscellaneous codes are important in maintaining communications order they do not in themselves have cognitive meaning. Table 8 shows the cognitive processes and their occurrence percentages.

Table 8. Cognitive Processes Occurrence Percentages.

Code	Cognitive Process	Number	Percentage
	Individual Knowledge Building		
Iic	Iterative information collection	17	1.39
Itk	Individual task knowledge development	612	50.12
Imm	Individual mental model development	7	0.57
	Team Knowledge Building		
Prta	Pattern recognition and trend analysis	3	0.25
Tmm	Team mental model development	12	0.98
Re	Recognition of expertise	3	0.25
Suk	Sharing unique knowledge	81	6.63
Ur	Uncertainty resolution	9	0.74
Ki	Knowledge interoperability	115	9.42
	Developing Shared Problem Conceptualization		
Vrm	Visualization and representation of meaning	1	0.08
Bcg	Building common ground	3	0.25
Ks	Knowledge sharing	0	0.00
Kt	Knowledge transfer	8	0.66
Tsu	Team shared understanding	3	0.25
	Team Consensus Development		
Ct	Critical thinking	0	0.00
Ms	Mental simulation	1	0.08
Idm	Intuitive decision making	1	0.08
iic2	Iterative information collection	0	0.00
Sog	Solution option generation	1	0.08
Sb	Storyboarding	1	0.08
Tprta	Team pattern recognition and trend analysis	0	0.00
Tnsa	Team negotiation of solution alternatives	0	0.00
	Outcome Appraisal		
Fi	Feedback interpretation	0	0.00
Rp	Re-planning	1	0.08
Tprta2	Team pattern recognition and trend analysis	0	0.00
	Added Codes		
Dta	Decision to take action	58	4.75
Misc	Miscellaneous/admin/incomplete	284	23.26
	TOTAL CODES	**1221**	100.00

To prevent the distortion of values in the data *miscellaneous* codes were removed and the data recalculated as shown in Table 9. The majority, 612 out of 1221 (50.1%), of the team communications were coded as *individual task knowledge development (itk).* In the NORAD and air traffic center communications these codes correspond to individual team members asking for clarification to data or information about the task at hand, or a response to clarification about the task. This implies that the watch-standers and air traffic control personnel were asking a great deal of questions and obtaining large amounts of information. The large number of questions should not be interpreted as incompetency on the part of the watch-standers, but rather as a means for them to understand and put together a picture of the large scale unique attack that took place on September 11, 2001.

Table 9. Revised Cognitive Processes Occurrence Percentages (excludes miscellaneous codes).

Code	Cognitive Process	Number	Percentage
	Individual Knowledge Building		
Iic	Iterative information collection	17	1.81
Itk	Individual task knowledge development	612	65.38
Imm	Individual mental model development	7	0.74
	Team Knowledge Building		
prta	Pattern recognition and trend analysis	3	0.32
tmm	Team mental model development	12	1.28
Re	Recognition of expertise	3	0.32
suk	Sharing unique knowledge	81	8.65
Ur	Uncertainty resolution	9	0.96
Ki	Knowledge interoperability	115	12.28
	Developing Shared Problem Conceptualization		
vrm	Visualization and representation of meaning	1	0.10
bcg	Building common ground	3	0.32
Ks	Knowledge sharing	0	0
Kt	Knowledge transfer	8	0.85
tsu	Team shared understanding	3	0.32
	Team Consensus Development		
Ct	Critical thinking	0	0
ms	Mental simulation	1	0.10
idm	Intuitive decision making	1	0.10
Iic2	Iterative information collection	0	0

Code	Cognitive Process	Number	Percentage
sog	Solution option generation	1	0.10
Sb	Storyboarding	1	0.10
tprta	Team pattern recognition and trend analysis	0	0
tnsa	Team negotiation of solution alternatives	0	0
	Outcome Appraisal		
Fi	Feedback interpretation	0	0
Rp	Re-planning	1	0.10
tprta2	Team pattern recognition and trend analysis	0	0
	Added Codes		
dta	Decision to take action	58	6.19
	TOTAL CODES	**937**	**100**

The cognitive process codes with smaller percentages of use show that the NEADS and FAA decision makers needed to collect a great amount of information before they were able to reach the *Team Consensus Development stage* and once there it was very difficult to develop a consensus due to the unusual nature of the attacks. Confusion as to the number of hijacked aircraft and which aircraft were hijacked in the *Team Knowledge Building stage* played a role in slowing down decision makers in reaching the *Team Consensus Development* stage and eventually *Outcome Appraisal stage.*

B. INTER-RATER RELIABILITY ANALYSIS

To assess the potential for subjectivity to influence the coders when applying the definitions for the cognitive processes, two coders were used to code the NORAD / FAA transcripts. After all coding had been finished by each coder individually; the results showed that the coders had initial disagreements where an agreement was reached in 41 of the 1221 (3.36%) communication turns. The disagreements where agreement was reached are highlighted in yellow in the transcripts found in the Appendix. Coders could not agree on a code in 18 of the 1221 (1.48%) communication turns. The disagreements where no agreement was reached are highlighted in red and denoted with an asterisk in the transcripts found in the Appendix.

Out of the 1221 communication turns the coders agreed on 1162 (95.16%) codes. It was observed that as the coders became more understanding of each others application of the cognitive definitions there were less disagreements. This is clearly seen by noting the high frequency of disagreements in the beginning stages of the transcripts. As the coding process continued the frequency of disagreements decreased dramatically.

Most of the disagreements between the coders occurred between the use of the codes *sharing unique knowledge (suk), exchange process where any information held uniquely by an individual is made available to all other group members and the group uses this information in their option selection process)* and *knowledge transfer (kt), the act of exchanging, actionable knowledge among team members.* In order to differentiate between these codes the coders established a guideline for coding turns that were coded *suk* or *kt*.

To use the *suk* code the information being exchanged must not have been exchanged before in the transcript, in other words it had to be a new piece of information being introduced to the team. To use the *kt* code the information exchanged might have been shared prior to being discussed again but the team as a whole was not aware of that piece of information and therefore the transfer of the information was useful to develop the team's mental model.

C. COGNITIVE PHASES IN RESPONDING TO THE 9/11 ATTACKS

All teams collaborating on a problem must have a mental model within which they are making their decisions (Garrity, 2007). Although there was confusion as to which aircraft were hijacked, and even some reports of aircraft with bombs onboard, for NEADS watch standers and air traffic control personnel the events of that morning were unforeseen and therefore they needed to continually revise their mental model of the situation and correspondingly alter their approach in responding to the events. The NEADS and FAA transcript is divided into four phases that correspond to the four major events which caused the mental models of NEADS watch-standers and air traffic control personnel to change.

The first event was the notification regarding the American Airlines flight 11 hijacking. Working this original mental model the FAA/NEADS team did not anticipate that terrorists would hijack an aircraft and crash it into a building; it was presumed by the team that the hijackers would make certain demands and once negotiations had been reached the passengers and the aircraft would be safe. As stated in the 9/11 Commission Report, "protocol presumed that the hijacking would take the traditional form: that is, it would not be a suicide hijacking designed to convert the aircraft into a guided missile (p. 35)."

The second event that changed the watch standers mental model was the crashing of AA 11 into the North Tower of the World Trade Center. During this phase the watch-standers and air traffic control personnel realized that they were dealing with an event that they had never trained for. The team was trying to handle an event for which no standard operating procedure had been developed; therefore team members had to change their mental model from "traditional" hijackings to hijacked aircrafts that were turned to missiles.

The third event that brought about a change of the FAA/NEADS team mental model involved the hijacking and crashing of United Airlines flight 175 into the South Tower of the World Trade Center. In a matter of minutes the team had faced a situation never before seen with the hijacking and crashing of AA 11, and now they had to deal with a second hijacking and intentional crashing of an aircraft. The team did not have much time to react to the news that a second aircraft had been hijacked since UA 175 crashed within minutes of the team learning of the hijacking.

The fourth and last event to require the FAA/NEADS team mental model to adapt was the hijacking and crashing of American Airlines flight 77 into the Pentagon, and finally the hijacking and crashing of United Airlines flight 93 into a field in Pennsylvania. It was now apparent that the United States was under attack. There was no telling how many other aircraft could be hijacked and used as missiles. The teams were scrambling to find a solution to the attacks and soon reached one when it was decided to shut down the North American airspace.

1. First Phase of Responding to the September 11 Attacks

Initially air traffic controllers did not suspect that AA 11 had been hijacked. The controller, on instruction from his supervisor, was following standard procedures for handling a "no radio" aircraft. A hijacking was finally suspected after the following transmission was received from one of the hijackers speaking in the cockpit of AA 11:

> We have some planes. Just stay quiet, and you'll be okay. We are returning to the airport. Nobody move. Everything will be okay. If you try to make any moves, you'll endanger yourselves and the airplane. Just stay quiet (National Commission on Terrorist Attacks upon the United States, 2004).

Upon receipt of this transmission the air controller followed standard operating procedures; he notified his supervisor who then notified the Herndon Command Center. After NEADS learned of the hijacking they took action in accordance with standard procedures and ordered two F-15 alert aircraft to battle stations.

During this first phase there were a total of 266 speech turns of which 150 (56.4%) were coded as ind*ividual task knowledge development (itk)*. The initial news of a hijack for both teams required personnel from NEADS and the FAA to begin collaborating on this complex and ambiguous problem. The high number of *individual task knowledge development* codes is explained by the need for members of both organizations to develop an understanding of the situation. Both teams involved are requesting information, need clarification of information, and are responding to the requests for clarification of information. These are analysis techniques which capture the communicative acts involved in *individual task knowledge development* (Fiore, 2007).

Although other macrocognitive processes were also used during this phase, none of the other macrocognitive processes are used as frequently as *individual task knowledge development (itk)* as depicted in Table 10.

Table 10. Frequency of macrocognitive processes used during first phase of the NEADS / FAA channel 4 transcripts.

Cognitive processes used in 1st phase of September 11 attack	No. of occurrences	Percentage
Iterative Information Collection	7	2.6
Individual Task Knowledge Development	150	56.4
Individual mental model development	2	0.8
Pattern recognition and trend analysis	3	1.1
Team mental model development	1	0.4
Sharing unique knowledge	16	6.2
Uncertainty resolution	6	2.3
Knowledge interoperability	26	9.8
Visualization and representation of meaning	1	0.4
Knowledge Transfer	1	0.4
Solution Option Generation	1	0.4
Decision to take action	10	3.8
Miscellaneous	42	15.8
Totals	266	100.0

The second most frequently used macrocognitive process during the first phase of the 9/11 attacks was *knowledge interoperability (ki)*. The FAA and NEADS teams were exchanging their knowledge of the problem to reach a common understanding and reduce uncertainty about the situation. By resolving uncertainty the team moves towards greater knowledge interoperability (Fiore, 2007).

2. Second Phase of Responding to the September 11 Attacks

In the second phase of the 9/11 attacks there continues to be a high number of speech turns coded as *individual task development (itk)* (65 occurrences accounting for 53.7% of the macrocognitive processes). By reducing uncertainty amongst team members in the first phase of the September 11 attack, there is a slight reduction in the team's questions and clarifications also known as *individual task knowledge development (itk).* This is seen by the slight decrease in the frequency of *individual task knowledge development (itk)* occurrences from the first phase (56.4%) to the second cognitive phase (53.7%), a difference of about 3 percentage points (see Tables 10 and 11).

This difference is attributed to teams exchanging their knowledge of the problem (knowledge interoperability) to reach an agreement between team members regarding their understanding of the problem. This in turn reduces the number of *individual task knowledge development* codes as reflected in Table 11.

Table 11. Frequency of macrocognitive processes used during second phase of the NEADS / FAA channel 4 transcripts.

Cognitive processes used in 2nd phase of September 11 attack	No. of occurrences	Percentage
Iterative information collection	3	2.5
Individual task knowledge development	65	53.7
Individual mental model development	1	0.8
Team mental model development	1	0.8
Recognition of expertise	1	0.8
Sharing unique knowledge	14	11.6
Knowledge interoperability	17	14.1
Decision to take action	11	9.1
Miscellaneous	8	6.6
Totals	121	100.0

3. Third Phase of Responding to the September 11 Attacks

In the third phase of responding to the September 11 attacks, we also observe a further decrease in the frequency of *individual task knowledge development* occurrences (47.0%) compared to the second cognitive phase (53.7%). Although much confusion is still observed in the transcript, the NEADS and FAA teams are now working with a shared mental model of the situation with each other; and therefore, the number of questions asked to clarify their understanding between the teams are decreasing.

An increase in the frequency of *knowledge interoperability (ki)* codes was also observed from the first phase (9.8%) to the second phase (14.1%). This increase in the frequency of *knowledge interoperability (ki)* occurrences accounts for the decrease in the percentage of individual task knowledge development codes from the second phase (53.7%) to the third phase (47.0%) of the September 11 attack, a difference of about 7 percentage points (see Tables 11 and 12).

It is during the third phase that the third airliner (United Airlines Flight 175) has been hijacked and crashes into the South Tower of the World Trade Center. It is also during this phase that the teams realize the gravity of the attacks and begin taking actions to shutdown the airspace in Boston and New York. Given that the problem is becoming bigger, one would think that more questions and clarifications would be asked between the team members in order to understand the scope of the situation, and therefore the number of *individual task knowledge development codes (itk)* would increase; but this was not the case. Although the problem as a whole became more complex from the second phase to third phase, the mental models of personnel at NEADS and the FAA were improving and adapting to each other's manner of passing information, thus decreasing the number of *individual task knowledge development (itk)* occurrences.

Table 12. Frequency of macrocognitive processes used during third phase of the NEADS / FAA channel 4 transcripts.

Cognitive processes used in 3rd phase of the September 11 attack	No. of occurrences	Percentage
Individual information collection	5	2.0
Individual task knowledge development	116	47
Individual mental model development	2	0.8
Team mental model development	1	0.4
Recognition of expertise	1	0.4
Sharing unique knowledge	17	6.9
Uncertainty resolution	1	0.4
Knowledge interoperability	34	13.8
Building common ground	1	0.4
Knowledge transfer	4	1.6
Mental simulation	1	0.4
Intuitive decision making	1	0.4
Decision to take action	17	6.9
Miscellaneous	46	18.6
Totals	247	100.0

In the third phase additional macrocognitive processes were being used for information exchanges between team members. As the teams attained a clearer understanding of the situation they moved into other stages of the model of team collaboration. In the first and second phases of the September 11 attacks, the teams were operating mostly in the *individual knowledge building* and *team knowledge building* phases. In the third phase of the September 11 attacks, the macrocognitive processes

labeled *mental simulation* and *intuitive decision making* that occur in the *team consensus development* phase of the model are being used, as depicted in Table 12. Although these macrocognitive processes were used once each in the third phase they nonetheless show that the team is moving towards a consensus in their mental model.

4. Fourth Phase of Responding to the September 11 Attacks

As the team reached the fourth phase they were fully aware that the United States was under attack and continued to develop their mental model to reach a solution. Although no final determination has been made about shutting down the national airspace at the beginning of the fourth phase, the decision will be rapidly passed down to air traffic controllers across the nation. The FAA air traffic controllers and NEADS team had handled the situation as best as they could and as they were trained (National Commission on Terrorist Attacks upon the United States., 2004).

In this fourth phase of the September 11 attack, the percentage of individual task knowledge development codes (47.9%) remains unchanged when compared to the third cognitive phase (47.0%) as depicted in Table 13. The percentages of the macrocognitive processes used during the third cognitive phase of the September 11 attack, *sharing unique knowledge (suk), knowledge interoperability (ki), and knowledge transfer (kt)* account for 22.3 percent of all codes in the third phase. This high percentage of information sharing helps keep speech turns coded as *individual task knowledge development (itk)* almost constant from the third phase to the fourth phase.

Due to the rapid nature of these unforeseen attacks the teams needed to quickly reach a decision as to how best to alleviate the situation. It is towards the end of the fourth phase that the FAA reached the decision to shutdown the national airspace, in turn reaching the final stage of the model, *outcome appraisal*. Although no mention of shutting down the national airspace appears in transcripts, the order was indeed given by the FAA, clearing the national airspace of all private and commercial aircraft just after 12 PM (EST) (Bronner, 2006).

Table 13. Frequency of macrocognitive processes used during fourth phase of the NEADS / FAA channel 4 transcripts.

Cognitive Processes used in 4th phase of the September 11 attack	No. of occurrences	Percentage
Iterative information collection	2	0.3
Individual task knowledge development	281	47.9
Individual mental model development	2	0.3
Team mental model development	9	1.5
Recognition of expertise	1	0.2
Sharing unique knowledge	34	5.8
Uncertainty resolution	2	0.3
Knowledge interoperability	38	6.5
Building common ground	2	0.3
Knowledge transfer	3	0.5
Team shared understanding	3	0.5
Storyboarding	1	0.2
Replanning	1	0.2
Decision to take action	20	3.4
Miscellaneous	188	32.0
Totals	587	100.00

D. CHI-SQUARE TEST

To test for independence between the cognitive processes a chi-square test was performed. The chi-square analysis was done on all 27 cognitive processes between all four phases of the attacks. The null hypothesis (H_0) was that there would be no difference in the usage of cognitive processes between the phases of the model. The alternate hypothesis (H_1) was that there would be a difference in the usage of cognitive processes between the phases of the model. The observed values of the percentages of cognitive processes used during the four phases of the September 11 attack are found in Table 14.

Table 14. Observed values of cognitive processes per phase.

CODE NUMBER	1	2	3	4	5	6	7
CODE	**iic**	**Itk**	**imm**	**Prta**	**tmm**	**Re**	**suk**
Phase 1	7	150	2	3	1	0	16
Phase 2	3	65	1	0	1	1	14
Phase 3	5	116	2	0	1	1	17
Phase 4	2	281	2	0	9	1	34

Total	17	612	7	3	12	3	81
CODE NUMBER	**8**	**9**	**10**	**11**	**12**	**13**	**14**
CODE	**Ur**	**Ki**	**Vrm**	**Bcg**	**ks**	**Kt**	**Tsu**
Phase 1	6	26	1	0	0	1	0
Phase 2	0	17	0	0	0	0	0
Phase 3	1	34	0	1	0	4	0
Phase 4	2	38	0	2	0	3	3
Total	9	115	1	3	0	8	3

CODE NUMBER	**15**	**16**	**17**	**18**	**19**	**20**	**21**
CODE	**Ct**	**Ms**	**idm**	**iic2**	**sog**	**Sb**	**Tprta**
Phase 1	0	0	0	0	1	0	0
Phase 2	0	0	0	0	0	0	0
Phase 3	0	1	1	0	0	0	0
Phase 4	0	0	0	0	0	1	0
Total	0	1	1	0	1	1	0

CODE NUMBER	**22**	**23**	**24**	**25**	**26**	**27**	
CODE	**Tnsa**	**Fi**	**rp**	**tprta2**	**Dta**	**Misc**	**N**
Phase 1	0	0	0	0	10	42	265
Phase 2	0	0	0	0	11	8	121
Phase 3	0	0	0	0	17	46	247
Phase 4	0	0	1	0	20	188	588
Total	0	0	1	0	58	284	1221

From the observed values, the calculation of expected frequency is performed using the following equation:

Expected Frequency = (row total)/(column total) x (sample size)

Where *(row total)* is the total number of communication turns coded as that cognitive process, *(column total)* is the total number of communication turns, and *(sample size)* is the total number of communication turns in that cognitive phase. The expected values are found in Table 15.

Table 15. Expected values of cognitive processes per phase.

CODE NUMBER	**1**	**2**	**3**	**4**	**5**	**6**	**7**
CODE	**iic**	**itk**	**imm**	**prta**	**Tmm**	**Re**	**Suk**
Phase 1	3.69	132.83	1.52	0.65	2.60	0.65	17.58
Phase 2	1.68	60.65	0.69	0.30	1.19	0.30	8.03
Phase 3	3.44	123.80	1.42	0.61	2.43	0.61	16.39
Phase 4	8.19	294.72	3.37	1.44	5.78	1.44	39.01

Total	17.00	612.00	7.00	3.00	12.00	3.00	81.00
CODE NUMBER	**8**	**9**	**10**	**11**	**12**	**13**	**14**
CODE	**ur**	**ki**	**vrm**	**bcg**	**Ks**	**Kt**	**Tsu**
Phase 1	1.95	24.96	0.22	0.65	0.00	1.74	0.65
Phase 2	0.89	11.40	0.10	0.30	0.00	0.79	0.30
Phase 3	1.82	23.26	0.20	0.61	0.00	1.62	0.61
Phase 4	4.33	55.38	0.48	1.44	0.00	3.85	1.44
Total	9.00	115.00	1.00	3.00	0.00	8.00	3.00

CODE NUMBER	**15**	**16**	**17**	**18**	**19**	**20**	**21**
CODE	**ct**	**ms**	**idm**	**iic2**	**Sog**	**Sb**	**Tprta**
Phase 1	0.00	0.22	0.22	0.00	0.22	0.22	0.00
Phase 2	0.00	0.10	0.10	0.00	0.10	0.10	0.00
Phase 3	0.00	0.20	0.20	0.00	0.20	0.20	0.00
Phase 4	0.00	0.48	0.48	0.00	0.48	0.48	0.00
Total	0.00	1.00	1.00	0.00	1.00	1.00	0.00

CODE NUMBER	**22**	**23**	**24**	**25**	**26**	**27**	
CODE	**tnsa**	**fi**	**rp**	**tprta2**	**Dta**	**Misc**	**N**
Phase 1	0.00	0.00	0.22	0.00	12.59	61.64	265.00
Phase 2	0.00	0.00	0.10	0.00	5.75	28.14	121.00
Phase 3	0.00	0.00	0.20	0.00	11.73	57.45	247.00
Phase 4	0.00	0.00	0.48	0.00	27.93	136.77	588.00
Total	0.00	0.00	1.00	0.00	58.00	284.00	1221.00

Finally the chi-square (χ^2) value is obtained by:

$$\chi^2 = \sum\left(\text{Observed} - \text{Expected}\right)^2 / \text{Expected}$$

The chi-square value of each cognitive code is seen in Table 16.

Table 16. Chi-square values of each cognitive processes per phase.

CODE NUMBER	**1**	**2**	**3**	**4**	**5**	**6**	**7**
CODE	**Iic**	**itk**	**imm**	**prta**	**Tmm**	**Re**	**Suk**
Phase 1	2.97	2.22	0.15	8.47	0.99	0.65	0.14
Phase 2	1.03	0.31	0.14	0.30	0.03	1.66	4.44
Phase 3	0.71	0.49	0.24	0.61	0.84	0.25	0.02
Phase 4	4.68	0.64	0.56	1.44	1.80	0.14	0.64
Total	9.38	3.66	1.09	10.82	3.65	2.70	5.25

CODE NUMBER	**8**	**9**	**10**	**11**	**12**	**13**	**14**
CODE	**ur**	**ki**	**vrm**	**bcg**	**Ks**	**Kt**	**Tsu**
Phase 1	8.38	0.04	2.82	0.65	#DIV/0!	0.31	0.65

Phase 2	0.89	2.76	0.10	0.30	#DIV/0!	0.79	0.30
Phase 3	0.37	4.95	0.20	0.25	#DIV/0!	3.50	0.61
Phase 4	1.26	5.45	0.48	0.21	#DIV/0!	0.19	1.67
Total	10.90	13.21	3.61	1.42	#DIV/0!	4.80	3.23

CODE NUMBER	**15**	**16**	**17**	**18**	**19**	**20**	**21**
CODE	**ct**	**ms**	**idm**	**iic2**	**Sog**	**Sb**	**Tprta**
Phase 1	#DIV/0!	0.22	0.22	#DIV/0!	2.82	0.22	#DIV/0!
Phase 2	#DIV/0!	0.10	0.10	#DIV/0!	0.10	0.10	#DIV/0!
Phase 3	#DIV/0!	3.15	3.15	#DIV/0!	0.20	0.20	#DIV/0!
Phase 4	#DIV/0!	0.48	0.48	#DIV/0!	0.48	0.56	#DIV/0!
Total	#DIV/0!	3.94	3.94	#DIV/0!	3.61	1.08	#DIV/0!

CODE NUMBER	**22**	**23**	**24**	**25**	**26**	**27**
CODE	**tnsa**	**fi**	**rp**	**tprta2**	**dta**	**misc**
Phase 1	#DIV/0!	#DIV/0!	0.22	#DIV/0!	0.53	6.26
Phase 2	#DIV/0!	#DIV/0!	0.10	#DIV/0!	4.80	14.42
Phase 3	#DIV/0!	#DIV/0!	0.20	#DIV/0!	2.36	2.28
Phase 4	#DIV/0!	#DIV/0!	0.56	#DIV/0!	2.25	19.19
Total	#DIV/0!	#DIV/0!	1.08	#DIV/0!	9.95	42.15
Chi-Square Value	***139.47***					

The 20 cognitive processes that were used were compared across all four phases of the September 11 attack and resulted in a chi-square (χ^2) value of 139.5. The critical χ^2 value for α of 0.05 is 101.9. Since our χ^2 is greater than our critical χ^2 for α of 0.05 (139.5 > 101.9) our null hypotheses is rejected. It is then determined that there is a significant difference in the usage of cognitive processes between the phases of the September 11 attack and that these cognitive processes are independent of each other.

The results also show that the team moved between the various cognitive phases suggested by the model. As stated before, progression through the phases of the model is not necessarily linear. The team as a whole kept updating its mental model to fit the unique events of that September morning and therefore moved between different cognitive phases. The results indicate that the NEADS and FAA teams made a progression from the initial *individual knowledge building phase* to the *team knowledge building phase*, the *developing shared problem conceptualization phase*, and at certain points entered the *team consensus development* and *outcome appraisal phases*.

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VII. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Coding results from the communication turns of NEADS and FAA air traffic centers on September 11, 2001 indicate that 20 of the 27 (74%) cognitive processes from the structural model of team collaboration were used. There was a total of seven unused codes; these were: *knowledge sharing (ks), critical thinking (ct), iterative information collection (iic2)* for team consensus development, *team pattern recognition and trend analysis (tprta), team negotiation of solution alternatives (tnsa), feedback interpretation (fi), and team pattern recognition and trend analysis (tprta2)* for outcome appraisal.

B. FAA / NEADS AND THE STRUCTURAL MODEL OF TEAM COLLABORATION

Analysis of the NEADS and FAA transcripts on September 11, 2001, is a beneficial addition in the validation of the structural model of team collaboration. The model can be applied to the NEADS and FAA communications transcripts. From the New York Fire Department (NYFD) team communication transcripts in the Garrity thesis, the FAA/NEADS channel 2 communications transcripts in the Johnson and Donaldson thesis, and now the FAA/NEADS channel 4 transcript the model has continued to grow, and is continually moving towards developing a better understanding of the team's cognitive processes during collaboration and decision making during real-world events.

C. FAA / NEADS - ROOM FOR IMPROVEMENT

On the morning of September 11, 2001, standard operating procedures (SOP) for interagency collaboration and the technology to communicate between the agencies was outdated. Although certain progress has been achieved since the attacks of September 11, 2001, there is vast room for improvement in the practices and technology used in interagency collaboration. The common operational picture used by civilian and military agencies is one of the areas where improvement can be made.

1. Common Operating Picture (COP)

To maintain situational awareness at all levels between government agencies, new measures are needed to keep these agencies equally focused. One of these measures is the development of a system that integrates all assets and feeds data obtained into a common operating picture. As Colonel Routt states in his report "*Interagency Improvement for Controlling and Protecting U.S. Airspace,"* "we must embrace and purchase existing and future technology. We do not need to use only FAA radars to build our picture. We can tie in an airborne warning and control system (AWACS), early warning systems, ships, temporary ground radar sites, fighter aircraft and perhaps satellites." Navy Commander Pat Bindl, Joint Data Networks Branch chief with the Joint C4I Systems Directorate (J6), describes it as, "the whole concept is to take diverse information from diverse platforms and put that information into a common format, correlate it, and fuse it to provide a singular output (Routt, 2008)."

Although there is existing technology that provides time critical information to decision makers it is important that the technology used is adaptable to all systems (Routt, 2008). This will help all agencies increase their situational awareness by keeping the agencies on the same picture. A coordinated effort to tie all capabilities into one operating system that each agency can utilize is of utmost importance and oversight needs to occur to ensure all agencies are focused on one common operating picture (Routt, 2008).

D. FUTURE RESEARCH POSSIBILITIES

Additional research can study the relationship between the individual task knowledge development macrocognitive process and knowledge interoperability macro-cognitive process through different phases. It was observed in this thesis that as knowledge interoperability increased between teams, individual task knowledge development decreased in the next phase. Future research can study if there is an interdependent relationship between these codes as teams progress through cognitive stages. Data for this research can be obtained from this thesis, the Garrity thesis (2007), and the Donaldson and Johnson thesis (2008).

E. USE OF LABORATORY COGNITIVE PROCESSES IN REAL-WORLD SCENARIOS

Use of laboratory cognitive processes such as *recognition of expertise (re), building common ground (bcg), and critical thinking* can be redefined and used in real world scenarios. As was the case in this thesis, the laboratory cognitive process *re* and *bcg* were slightly modified and used in the coding of the NEADS / FAA channel four transcript, since they best explained the essence of the information exchange between team members. Limiting these cognitive processes to definitions pertinent to laboratory settings hampers the ability to correctly code team communications from real world scenarios.

F. EXCESSIVE INFORMATION IN THE MODEL

Too much information in team collaboration or any communications network hampers the ability of commanders to make decisions and delays achieving situational awareness in complex team problem solving. Research can be performed to study how too much information delays teams in progressing through the different cognitive stages. Research can also investigate if information overload prevents teams from reaching the *team consensus development stage* and *outcome appraisal stage* in the structural model of team collaboration.

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APPENDIX. NORTHEAST AIR DEFENSE SECTOR AND FEDERAL AVIATION ADMINISTRATION CHANNEL 4 TRANSCRIPTS FROM SEPTEMBER 11, 2001, 0837 THROUGH 1106 (EST)

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
1	ki/rta	ki/rta	8:37:52	***Boston Center***	***hi. Boston center TMU (traffic management unit), we have a problem here. We have a hijacked aircraft headed towards new york, and we need you guys to, we need someone to scramble some F-16's or something up there, help us out.***
2	itk	itk		***Powell***	***is this real world or exercise?***
3	itk	itk		***Boston Center***	***no, this is not an exercise, not a test.***
4					
5	itk	itk		**Stacia**	Woah! What was that?
6	itk	itk		**Sgt Watson**	Was that real world?
7	itk	itk		**Stacia**	Real world highjack
8	itk	itk		**Sgt Watson**	Cool . Where is it?
9	misc	misc		**Sgt Watson**	No shit…
10				***panting"**	
11	itk	itk		**Stacia**	Who called you?
12	misc	misc		**Hunters 3**	Locksend visual one right now
13	misc	misc		**Sgt Watson**	Locksend?
14				**Open line**	
15	misc	misc		**Agency man**	Locksend lowtech
16	suk	suk		**Sgt Watson**	Yes, Hunters calling in reference to the highjack
17	itk	itk		**Boston Center**	Yes?
18	itk	itk		**Sgt Watson**	We're checking to get some information from you if

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					we could?
19	itk	itk		**Boston Center**	OK, what do you need?
20	itk	itk		**Sgt Watson**	We need call signs, type aircraft?
21	itk	itk		**Boston Center**	It's a American 11
22	itk	itk		**Sgt Watson**	American 11?
23	itk	itk		**Boston Center**	Type aircraft is a 767
24	itk	itk		**Sgt Watson**	And…??'s number, do you know that?
25	itk	itk		**Boston Center**	Um, I don't know…hold on. Hey Dan? Do you got souls on and all that information? (we don't have any) No we don't have any of that information.
26	itk	itk		**Sgt Watson**	You don't have any of that?
27	itk	itk		**Boston Center**	?? location's about 40 miles North of Kennedy
28	itk	itk		**Sgt Watson**	40 miles north of Kennedy?
29	itk	itk		**Boston Center**	Right.
30	itk	itk		**Sgt Watson**	Do you have a mode 3?
31	itk	itk		**Boston Center**	No we don't he's a primary target only
32	itk	itk		**Sgt Watson**	Primary target only?
33	itk	itk		**Boston Center**	Yup
34	itk	itk		**Sgt Watson**	OK and you don't know where he's coming from or his destination?
35	itk	itk		**Boston**	No idea. He took off out of Boston originally heading

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
				Center	for Los Angeles.
36	itk	itk		**Sgt Watson**	Boston to Los Angeles?
37	itk	itk		**Boston Center**	That was his original destination yea.
38	itk	itk		**Sgt Watson**	And where are they going now do you know?
39	itk/imm	itk/imm		**Boston Center**	No idea, he's heading towards Kennedy, oh looks like speed is decreasing. Um not exactly sure where, nobody really.
40	itk	itk		**Sgt Watson**	Are you the controlling agency? Or is New York?
41	itk	itk		**Boston Center**	Right now we are, he's heading to the New York center
42	itk	itk		**Sgt Watson**	And is there any military assistance requested?
43	itk	itk		**Boston Center**	Uh, yes we are actually trying to get F16s to..
44	itk	itk		**Sgt Watson**	Yes, did you want F16s out?
45	itk	itk		**Boston Center**	Yea F16s out of Otis
46	itk	itk		**Sgt Watson**	But you don't have uh, have any modes or codes on him?
47	itk	itk		**Boston Center**	Um nope right now its just uh, no we don't have any modes yet
48	itk	itk		**Sgt Watson**	Is he inbound to JFK?
49	itk	itk		**Boston Center**	We, we don't know
50	prta/itk	prta/itk		**Sgt Watson**	You don't know where he is at all?
51	misc	misc		**Boston Center**	He's being high jacked, the pilots having a hard time talking to the…I mean we don't know, we don't know where he's going. He's heading towards Kennedy, he's

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					uh, like I said he's about 35 miles outside of Kennedy now at 367 knots.
52	itk	misc		**Sgt Watson**	Ok
53	itk	itk		**Boston Center**	I have no idea where he's going or…
54	tsu	itk		**Sgt Watson**	If you could please give and let us know of any information that would be great.
55	itk/suk	itk/suk		**Boston Center**	OK right now I guess we're tryin to work on, I guess there's been some threats in the cockpit, the..
56	itk	itk		**(backgroun d) Stacia:**	threats in the cockpit
57	itk	itk		**Sgt Watson**	Threats in what? I'm sorry.
58	iic	iic		**Boston Center**	Um…we'll call you right back as soon as we know more info.
59	misc	misc		**Sgt Watson**	Thank you. Sure.
60	misc	misc		**Boston Center**	OK. *hang up*
61	ki	ki		**Stacia**	Ok he said threats in the cockpit
62	ki	ki		**Sgt Watson**	40 miles north of JFK
63	misc	misc		**H4**	we don't have ??
64	misc	misc		**Sgt Watson**	?? threat level
65	ki	itk		**Stacia**	40 miles out of New York
66	itk	itk		**Sgt Watson**	we don't even know
67	itk/suk	itk/suk		**Stacia**	that's fine, how many souls onboard, he was originally going into Boston
68	misc	misc		**H3**	?? Check
69	misc	misc		**Stacia**	Oh no
70	misc	iic		**Sgt Watson**	767

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
71	misc	iic		**Stacia**	767
72	misc	iic		**H4**	Boston to LA
73	itk	imm		**Sgt Watson**	Boston to Los Angeles was his original supposed…
74	ki	ki		**Stacia**	well his original was Boston to Los Angeles
75	misc	misc		**Sgt Watson**	no kiddin
76	misc	misc		**Stacia**	yup that was…
77	misc	misc		**Sgt Watson**	umm, Boston to Los Angeles I wonder
78	itk	itk		**H4**	American what?
79	itk	itk		**Sgt Watson**	American 11
80	imm	suk		**Stacia**	No way we can find him without a mode 3
81	misc	misc		**Sgt Watson**	I got cold chills, oh my God
82	itk	itk		**Sgt Watson**	Ok F16
83	itk	itk		**H4**	can't find him?
84	iic	iic		**Sgt Watson**	Uh, no..Well she's gonna try to query an American 11
85	ki	ki		**H4**	well call back and see if they had a mode 3
86				***dial tone***	
87				***dialing and calling tone***	
88	misc	misc		**Boston Center**	Boston center
89	itk	itk		**Sgt Watson**	yeah hunters calling ?? did u guys have a mode 3 on American 11?
90	suk	suk		**Boston Center**	Last uh, last altitude we saw him he was descending to flight level 2-9-0.
91	itk	itk		**Sgt Watson**	Do you have a, im sorry, a prior mode 3 for American 11?
92	misc	misc		**Boston**	Um

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
				Center	
93	iic*	ur*		**(Backgroun d)H4**	calling back to see if they have a mode 3
94	itk*/suk	ur*/suk		**Sgt Watson**	do you have anything, any information for mode 3 because we can locate him on the ?scope? so…
95	suk	suk		**Boston Center**	well uh, last known altitude was flight level 2-niner-0, before that he was requesting, uh, hold on it looks like he was requesting flight level 3-5-0.
96	itk	itk		**Sgt Watson**	ok all we're asking is your mode 3…your mode 3. Did you assign any mode 3 to that aircraft?
97	itk	itk		**Boston Center**	uuum, original was uh…hold on
98	sog	sog		**Sgt Watson**	we still should be able to get it without 53
99	ki	ki		**Boston Center**	you have to file it, you have to file a 3
100	imm	imm		**Boston Center**	uh, we don't have any mode 3 right now,
101	misc	misc		**Sgt Watson**	nothing, you guys…
102	prta	prta		**Boston Center**	hes a primary target only, um I don't even know what his original..i could try and find his original mode 3
103	itk	itk		**Sgt Watson**	yeah that's all we need
104	misc	misc		**Boston Center**	hold on
105	ki*	ur*	8:41:58	**Sgt Watson**	they don't know yet
106	ki*	ur*		**Boston Center**	they don't know, they don't have a mode 3
107	misc	misc		**Sgt Watson**	he's gonna try to give us…
108	itk	itk		**Boston**	can't you even fly him with a mode 3 though? ?? says

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
				Center	American 11
109	ki	ki		**Sgt Watson**	he uh, he's having a rough time talking cause he's making threats in the cockpit
110	sog/itk	ki/itk		**H4**	you know what I have an idea. ask him if he's got anybody like near the aircraft that's got stats on him, ??? maybe he can find out where the hell he's by
111	misc	misc		**Sgt Watson**	Ok
112	ki	ki		**Boston Center**	they can see him on primary
113	itk	itk		**Sgt Watson**	so…anybody 2-9-0 altitude
114	misc	misc		**Boston Center**	Hello
115	misc	misc		**Sgt Watson**	yes go ahead
116	ur/suk	ur/suk		**Boston Center**	his original code was 1443
117	ur	ur		**Sgt Watson**	1443…copy that, sir. One more question
118	misc	misc		**Boston Center**	Yup
119	itk/rta	itk/rta		**Sgt Watson**	are any aircrafts close by him that uh maybe can give us a mode 3?
120	misc	misc		**Boston Center**	Umm
121	misc	misc		**Sgt Watson**	Yes
122	itk/suk	itk/suk		**Boston Center**	I think we're working on that. I don't have anybody next to him right now but um his speed is slowing down now, he's flying southwest bound now so… we don't have anybody close to him
123	misc	misc		**Sgt Watson**	ok thank you sir

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
125	misc	misc		**Boston Center**	None
126	misc	misc		**Sgt Watson**	none!
127	suk	suk		**Boston Center**	he's not coming up on a 1443
128	itk*	misc*		**Sgt Watson**	1443
129	itk	itk		**Boston Center**	?? speed check on the scope up there, approximate location
130	itk	itk		**H3**	last known position?
131	ki/coa	ki/coa		**Sgt Watson**	he said nobody should have a surveillance, hit up that area, looks like they are though
132	itk	itk		**H3**	you know what just hittin up ?? around that area
133	itk	itk		**Sgt Watson**	he said nobody in that, nobody in…uh
134	itk	itk		**H3**	ok whats this uh…
135	itk	itk		**Sgt Watson**	have they…who's talking to New York? Giving them a heads up? Anybody called New York, giving them a heads up?
137	itk	itk	8:44:59	***Fox***	***MCC(mission crew commander), I don't know where I'm scrambling these guys to. I need a direction, a destination***
138	itk	itk		***Nasypany***	***O.K. I'm going to give you the Z point (coordinate). Its just north of new york city.***
139	itk	itk		***Fox***	***I got this lat/long, 41-15, 74-36, or 73-46***
140	itk	itk		***Nasypany***	***head'em in that direction***
141	misc	misc		***Fox***	***copy that***
143	misc	misc		**Stacia**	?? centers ID
144	misc	misc		**Sgt Watson**	its around there steve.
146	ki	suk	8:46:58	**Sgt Watson**	New York ?? hunters ID…? New York, yes I am…are

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					you aware of the possible high jack of American 11.
147	itk	itk		**NY**	no I'm not
148	suk/ki	suk/ki		**Sgt Watson**	??? boston center, ma'am, we just got information theres a real world high jack American 11 he is headed…he was 40 miles north of JFK, headed towards JFK, um we're trying to find out any information that we possibly can, apparently the pilot was having a rough time because there has been threats in the cock pit
149	suk	suk		**Sgt Watson in background:**	we were calling New York, they are not aware of this
150	suk/ki/kt/itk	suk/ki/kt/itk		**Sgt Watson**	he was started out of boston headed for los angeles now headed for JFK, we do have military assistance that is after him, 2 F16s, uh wanted to give you a heads up to let you know American 11 and we are trying to locate any information as far as a location to where he is currently, a mode 3, do you have any information whatsoever?
151	ki	tmmd		**NY**	um I do not hold on one second….(talking to own people) She's trying to locate that mode 3
152	ki	ki		**NY2**	we got nothing, 1443 that's mode 3, uh at this point…
153	itk	itk		**ny**	hold on, you heard that right?
154	misc	misc		**Sgt Watson**	Hmm
155	itk/coa	itk/coa		**Sgt Watson**	cmon new York…airborne?...hey you know what? Lets get a tail number off of him for American 11. Call boston American 11,

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
156	coa	coa		**Stacia**	tell them we need the tail number of the aircraft
157	itk	itk		**H4**	American 11?
158	itk	itk		**Sgt Watson**	yes it is
159	ki	ki		**NY**	right now he's primary only
160	itk	itk		**Sgt Watson**	you have no mode 3 or anything?
161	misc	misc		**NY**	umm, im not…
162	itk	itk		**Sgt Watson**	or a location?
163	itk	itk		**NY**	not showing anything no
164	itk	itk		**Sgt Watson**	a lat long?
165	itk	itk		**NY**	hold on a I can get a lat long hold on a second
166	itk	itk		**Sgt Watson**	we're gonna get an updated lat long now…what
167	itk	itk		**Stacia**	we got an updated lat long.
168	itk	itk		**H4**	do you have an illustration
169	ki	ki		**Stacia**	We called Boston his filed one was 1443 but he's not, he's not working that he's on primary only, we're getting an updated lat long position and im gonna get a ..
170	itk	itk		**NY**	he's showin a 40-39 North
171	itk	itk		**Sgt Watson**	40-39 north
172	itk	itk		**NY**	and 74-03 west
173	itk	itk		**Sgt Watson**	74-03 west
174	itk	itk		**Sgt Watson**	what was your last one
175	itk	itk		**NY**	whats what?
176	misc	misc		**Sgt Watson**	thank you ma'am
177	itk	itk		**Sgt Watson**	hey did we get a tail number?
178	itk/vrm	itk/vrm		**Stacia**	right there
179	prta	prta		**Sgt Watson**	that's where she said it was I don't see anybody going, what wait a minute…learn how to offset

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
180	itk	itk		**Sgt Watson**	hello…forgot how to offset…4-6 scrambled?...that v-point?
181	itk	itk		**Stacia**	40-29-34
182	itk/ki	itk/ki		**H4**	uhh..rough 40, at 4-6 nope…I got 8 miles..
183				***phone ringing***	
184	misc	misc		**H4**	ok me and him will sit down
185	coa	coa		**Sgt Watson**	lets bring it up and find a um, a primary
186	ki/coa/coa	ki/coa/coa		**Stacia**	well we are looking to see for a search target, all they have is primary, I don't see…well she knows that…tell them, hey call her back and tell her that we want uh ask if its possible, if shes not too busy that we need updates every 3-5 minutes…we need lat long updates
187	itk	itk		**Sgt Watson**	is there any way ma'am that we can get updates as far as the latlong for that aircraft, you know as often…
188	itk	itk		**NY**	actually I'm showing their tracking coast right now, so I don't
189	itk	itk		**Sgt Watson**	tracking coast what does that mean…is he northbound?
190	itk	itk		**NY**	it means as far as I'm showing we lost track on him, let me see if I can find out and…
191	misc	misc		**Sgt Watson**	Yea
192	misc	misc		**NYMC**	Yes hi good morning, this is New York military calling at New York center.
193	misc	misc		**Sgt Watson**	hi how are you doing
194	itk	itk		**NYMC**	good good, our uh watch supervisor needs a number for a possible highjacking, he wants to call somebody in case we need some assistance with your fighter jets
195	itk	itk		**Sgt Watson**	alrighty, our phone number is, dsn or commercial?

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
196	itk	itk		**NYMC**	uh its going to be commercial out there.
197	itk	itk		**Sgt Watson**	Ok its going to be area code 315
198	misc	misc		**Stacia**	just give'em, here
199	itk	itk		**Sgt Watson**	no they want the commercial number..yeah they don't have dsn though
200	itk	itk		**Stacia**	I know that's what im saying
201	itk	itk		**Sgt Watson**	What
202	itk	itk		**Stacia**	just give'em this one I doesn't matter…they're monitoring us anyway
203	misc	misc		**Sgt Watson**	hunters id 26
204	misc	misc		**NYMC**	ma'am go ahead
205	itk	itk		**Sgt Watson**	you can contact 631-468-5959 and they can keep you a little more updated on that
206	itk	itk		**NYMC**	thats a local ma'am
207	itk	itk		**Sgt Watson**	im sorry ? No that's New York Center
208	coa	coa		**Stacia**	dial that number
209	itk	itk		**Sgt Watson**	can we dial out long distance from here?
210	itk	itk		**Stacia**	Yeah
211	itk	itk		**Sgt Watson**	*dialing* (call could not be completed as dialed) we can't call long distance
212	ki	ki		**Stacia**	there gonna give us lat long updates
213	rta	rta		**Sgt Watson**	you wanna dial this number
214	ki	tmmd		**Stacia**	shes watching him, that last lat long is 40-39 n, 74-03w and their gonna give 3 and 5 minute updates
215	itk/itk	itk/itk		**Sgt Watson**	a plane just flew into the world trade center?...a 737
216	itk	itk		**Stacia**	who you talking to?
217	coa/misc	coa/misc		**Stacia**	get, patch into them...oh my god (repeated)
218	suk	suk		**Sgt Watson**	its not on the news, a plane just crashed into the world

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					trade center
219	coa	tmmd		**Stacia**	gotta update new york
220	misc	misc		**Sgt Watson**	New York this is hunters id
221	coa	coa		**Stacia**	see if they lost altitude on that plane altogether
222	misc	misc		**NYMC**	New York
223	ki	ki		**Sgt Watson**	yes ma'am did you just hear the information regarding the world trade center
224	itk	itk		**NYMC**	No
225	ki	ki		**Sgt Watson**	being hit by an aircraft
226	itk	itk		**NYMC**	im sorry
227	itk	itk		**Sgt Watson**	being hit by an aircraft
228	misc	misc		**NYMC**	it couldn't
229	ki/itk	ki/itk		**Sgt Watson**	its on the world news....do you still have altitude on that aircraft
230	itk	itk		**NYMC**	no, like I said I don't work the radar here
231	itk	itk		**Sgt Watson**	you said you lost contact though?
232	coa	coa		**Stacia**	call this number right here again
233	ki	ki		**NYMC**	um 621-468-5959
234	ki/itk	ki/itk		**Sgt Watson**	we cannot get through to that number is there any other number for New York Military?
235	itk	itk		**NYMC**	um no theres no, that's the only number I have for operations here
236	ki/suk	ki/suk		**Sgt Watson**	ok, just wanted to give you a heads up that there was an aircraft that hit the world trade center just a few minutes ago, but apparently its not that guy
237	misc	tmmd		**Stacia**	Nope
238	ki	ki		**Sgt Watson**	we're just trying to find out what we can ma'am, we're trying to sort it out but that phone number you gave us I

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					can't reach anybody
239	rta	rta		**Stacia**	we need to find out who's tracking this guy on that scope in new york center and see if he still has an altitude
240			8:51:55		
241	itk	itk		**Sgt Watson**	new york center hunters id...is anyone tracking the highjacked American 11
242	itk	itk		**NYMC**	im sorry start over again, what about American 11
243	itk	itk		**Sgt Watson**	the highjacked aircraft American 11, is anyone tracking from new york center that aircraft
244	itk/ki	itk/ki		**NYMC**	we had a primary target on him we are trying to follow the best we can, hes not squawking a beacon code whatsoever
245	itk	itk		**Sgt Watson**	can you still see primary
246	itk/suk	itk/suk		**NYMC**	no I don't not see a primary target at this moment however he's not in my airspace so
247	ki	tmmd		**Sgt Watson**	ok just wanted to give you a heads up new york, I don't know if you know but the world trade center's just been hit by an aircraft, real word
248	itk	itk		**NYMC**	you have that confirmed
249	itk	itk		**Sgt Watson**	it is on the news sir, right now
250	misc	misc		**NYMC**	hmm, ok...im sorry theres too many people talking at once
251	misc	misc		**Sgt Watson**	yeah I hear that too thank you...if theres anything else we need we'll give you a call
252	misc	misc		**NYMC**	ok thank you
253			8:54:05		

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
254	itk	itk		**Stacia**	are we still trying to work a tail number on this guy
255	itk	itk		**Stacia**	you have a hot line to new york military..o no boston military
256	itk/itk	itk/itk		**Stacia**	where is it as in comparison to u track... And they lost primary
257	itk/ki	itk/iic		**Sgt Watson**	theres the number, he's giving me the tail number on the line right now, but theres the number for new york if you want to call them
258	ki/itk	ki/itk		**Stacia**	that's the same number Shelly got...did you get that to work?...a 1427
259	rta	rta		**Sgt Watson**	tried it on the phone...you can try the black phone
260	itk	itk		**Stacia**	he did crash into the world trade center whos giving you that confirmation?
261	itk/itk	itk/itk		**Stacia**	Boston? Boston's confirming that was the aircraft that crashed into the world trade center
262	suk	suk		**Sgt Watson**	American 11....Boston's confirming it is the aircraft
263	itk	itk		**Sgt Watson**	souls on board yet?
264	suk	suk		**Stacia**	the tail number is November 334 Alpha Alpha, on American 11
265	ki	ki		**Sgt Watson**	November 334 Alpha Alpha
266	itk	suk		**Stacia**	....that it dropped down to 280 knots and they lost altitude
267	itk/itk	itk/itk		**Sgt Watson**	where would you get that phone number?...state of emergency phone number is that what she needs?
268					*dialing*
270	misc	misc		**Sgt Watson**	985 hunters ID go
271	rta	rta		**Sgt Watson**	985 hunters, you're coming in broken please send mode 3

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
272	suk	suk		**man**	5362
273	iic	iic		**Sgt Watson**	985 hunters copies 5362, please stand by
274	rta	rta		**Sgt Watson**	um mo you want to scream up to weapons and tell them 985 is the delta north of J53 they were wondering about it
275	itk	itk		**h4**	can we get the confirmed crash time
276	itk	itk		**Sgt Watson**	no, I don't have the confirmed crash time, she was on the phone with it
277	itk	itk		**h4**	estimate 12:57
278					*call in*
279	coa	coa		**Sgt Watson**	give me...ok mode 4 out of 53, not access, im sorry
280			9:01:58		
281	misc	misc		**Sgt Watson**	985 hunters
282	misc	misc		**985**	yes go ahead ma'am
283	suk	suk		**Sgt Watson**	yes sir im open mode 3 but unable to open mode 4 through hunters
284	itk	itk		**985**	copy that, do you have a control of whiskey 105, this morning
285	rta	rta		**Sgt Watson**	985 please stay on the line im going to have hunters come up on 364 – 02
286	suk	suk		**Sgt Watson**	they have a second possible highjack
287	suk	tmmd		**h4**	3320 is way over here by lake Erie
288	suk/imm	suk/imm		**Sgt Watson**	united 175 is the other aircraft...mode 3, 3321
289	itk	itk		**Sgt Watson**	boston hunters calling you back, do you have any information on the united 175 aircraft at all?
290	itk	itk		**Boston Mil**	uh standby is that the call sign you have?
291	itk/ki	suk		**Sgt Watson**	we have a united 175 possibly a highjacked also
292	itk/itk	itk/itk		**Boston Mil**	united 175? …do you wanna check anything on that

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					because we can…what was your request on that
293	ki/itk/itk	ki/itk/itk		**Sgt Watson**	request for a united 175, possible highjacked aircraft also, we are looking for, we have a mode 3 of 3321, we're looking for information. Any information regarding a tail number or anything that you have. Do you have any information on that?
294	itk/itk	itk/itk		**Boston Mil**	ok I will check on that mode 3 3321, united 175, do you know his departure and destination, by any chance, we're looking at…
295	itk/suk/itk	itk/suk/itk		**Boston Mil**	negative, we just found out from new york center of a possible crash also, you heard about the first?
296	itk	itk		**Sgt Watson**	Yes
297	suk	suk		**Boston Mil**	ok possibly a second
298	suk	suk		**Boston Mil**	checking on the flight plan right now if you want to hold on a second…ok we shut down our traffic here at boston center
299	kt	kt		**Sgt Watson**	Boston has shut down their aircraft all around
300	itk	itk		**Boston Mil**	what you say now?...Boston to Lax?
301	itk	itk		**Sgt Watson**	Boston to lax?
302	misc	misc		**Boston Mil**	hold on a second
303	rta/ki	rta		**Boston Mil**	you still tracking now, can we go to code 3321 see if we can hit anywhere him, that's where they believe it is
304	itk	itk		**Sgt Watson**	type aircraft sir?
305	itk	itk		**Boston Mil**	uh…do you have a type aircraft on that united 175…767?
306	itk	itk		**Sgt Watson**	another 767?
307	itk	itk		**Boston Mil**	tsp down says it's a 767

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
308	rta/itk	rta/itk		**Sgt Watson**	ok and if you want to you can go ahead and give us a call back if you find out anything as far as tail number or souls on board or anything like that sir?
309	misc	misc		**Boston Mil**	Ok
310	misc	misc		**Sgt Watson**	we realize your busy thank you sir
311	ki	ki		**Sgt Watson**	ok sir Boston has stopped all their traffic around completely.
312	misc	misc		**?? Man**	copy 5362
313	misc	misc		**Sgt Watson**	open line, hunters id
314	itk	itk		**East ID**	hi its 10 east id mast corp nickelson, have a quick question, did something happen to the world trade center?
315	itk/ki	itk/ki		**Sgt Watson**	yes sir just wanted to give you a heads up two confirmed, not confirmed, one highjacked aircraft possibly another one, yes we do have the information and we are working it all right now
316	itk	itk		**East ID**	this is for live world right?
317	itk	itk		**Sgt Watson**	real world
318	itk	itk		**East ID**	Possibly one highjack?
319	itk	itk		**East ID**	um these are two aircraft out of boston, headed for LAX, apparently highjacked, we don't have anything other than that right now
320	itk	iic		**Stacia**	you got mode 3? I need that or else I can't find'em
321	itk/itk	itk/itk		**Stacia**	who are they out of, where are they out of?
322	ki	ki		**Stacia**	I need to get team 2, no tankers
323	ki	ki		**Stacia**	204 to 212, en route, 204 to 212…
324	iic	iic		**Steve**	let me get more data
325	ki/itk/itk	ki/itk/itk		**Stacia**	yes we definitely need a mode 3 or else we can't find

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					them steve…did they say last known flight level of the second aircraft
326	itk	itk		**Sgt Watson**	ok so you got your united 175 information from New York
327	itk	itk		**Stacia**	New York
328	itk	itk		**Stacia**	did we get a tail number on that united 175 yet?
329	itk	coa		**Sgt Watson**	I can call Boston back
330	misc	misc		**Boston Mil**	Boston military desk
331			9:06:58		
332	itk	itk		**Stacia**	yes sir sorry to bother you again this is hunters, any tail numbers whatsoever on these aircrafts, actually I don't have it on the American 11 they are asking for the united 175
333	suk	itk		**Boston Mil**	ok we are on the phone with united right now
334	itk	itk		**Stacia**	you are on the phone with united 175
335	itk	itk		**Boston Mil**	no with united airlines
336	itk	itk		**Stacia**	united airlines
337	misc	misc		**Boston Mil**	stand by 1
338	misc	misc		**Stacia**	thank you
339	itk	itk		**Stacia**	boston is online with united right now
340	suk	itk		**Boston Mil**	united airlines dispatch says what they know is united 175 is at this time the aircraft is nordo, not in radio contact
341	itk	itk		**Sgt Watson**	nordo?
342	itk	itk		**Boston Mil**	that is correct
343	itk/ki/ms	itk/suk/ms		**Sgt Watson**	is it still airborne sir because we have possible confirmation that this is another highjacked aircraft that could crash into the world trade center

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
344	itk/ki	itk/ki		**Boston Mil**	we don't not know if he's airborne right now, we're trying to research it, he's in New York airspace
345	itk	itk		**Sgt Watson**	you get a tail number?
346	itk	itk		**Boston Mil**	no I don't have that information
347	misc	misc		**Sgt Watson**	ok copy, thank you boston
348	misc	misc		**Sgt Watson**	giant killers hunters id 72
349	itk	Itk		**Sgt Watson**	yes sir how many aircraft do you have in 72 at this time
350	itk	Itk		**GK**	currently have two F18s and a lear jet
351	coa/ki/coa	coa/ki/coa		**Sgt Watson**	mark whenever you have an aircraft in 72, he's got two F18s and one lear jet just so you know, just go ahead give giant killer a call, I realize all this stuff going on, just give giant killer a call and say he what you got in 72 right now, you know just don't make him friendly
352	kt	Kt		**Stacia**	we've got Langley on battles stations right now
353	misc	misc		**Sgt Watson**	that's fine
354			9:11:58	**13:11:58 (mp3 46:58)**	
355	itk	Itk		**Sgt Watson**	Im confused why weapons said its Maine 85
356	misc	misc		**Stacia**	doesn't really know the …
357	itk	Itk		**Sgt Watson**	who mark
358	itk	Itk		**Stacia**	I guess he said it wasn't but it should be Maine 85…
359	itk/coa/itk	itk/coa/itk		**Sgt Watson**	could be maybe their aircraft or something I don't know, but find out where he is exactly…the Maine 85…and ask him why he said that wasn't it
360	misc	misc		**Sgt Watson**	us hunters reference united 175
361	suk/itk	suk/itk		**Sgt Watson**	us hunters checking on united 175, apparently confirmation the second aircraft hit the world trade center

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
362	itk	Itk			I have no idea
363	tmmd	tmmd		**Sgt Watson**	boston was telling me its in your airspace that's why I'm calling
364	ki/itk	ki/itk			its in the new york trade con airspace but I have no idea what the plane is….someone told me one was an American airlines out of Boston to LA
365	itk	Itk		**Sgt Watson**	It was American 11
366	itk	Itk			but the other one I have no idea
367	itk	Itk		**Sgt Watson**	you don't? Ok
368	misc	misc		**Sgt Watson**	hunters id
369	misc	misc		**NYMC**	this is new york military calling, someone on the floor on the floor said they wanted.
370	misc	misc		**Sgt Watson**	there they are
371	misc	misc		**NYMC**	Whatsup
372	itk	Itk		**Sgt Watson**	new york military, hunters, checking on united 175i heard that he was in your airspace do you have contact with that aircraft airborne?
373	itk/suk	itk/suk		**NYMC**	no united 175 that was the second aircraft that crashed into the world trade center
374	ur/itk	ur/itk		**Sgt Watson**	that's what I needed sir was confirmation, only one other question, the souls on board of either aircraft do you know
375	itk/ki	itk/ki		**NYMC**	you'd have to get Boston center on that, they were both out of Boston heading to Los Angeles, Boston would have that information, we don't have that information yet
376	misc	misc		**Sgt Watson**	thank you sir
377	misc	misc		**Boston Mil**	boston mil

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
378	itk	Itk		**Sgt Watson**	Boston's hunters, just checking one last time for the souls on board of either aircraft, new york told me to call you
379	itk/suk	itk/suk		**Boston Mil**	the estimate we have on united 175 is only an estimate, they locked it up, so I guess we don't have access because they locked it up, the guy said he looked at once before and he believes there were only 75 on the united 175
380	itk	Itk		**Sgt Watson**	nothing on the American 11?
381	itk/ki	itk/ki		**Boston Mil**	that's an estimate, nothing on the American. I do have a tail number for that united if you want it,
382	misc	misc		**Sgt Watson**	ok go ahead
383	misc	misc		**Boston Mil**	hold on one second
384	misc	misc		**Boston Mil**	stand by 1
385	misc	misc		**Boston Mil**	thank you
386	itk	Itk		**Boston Mil**	November 612 uniform alpha
387	itk	Itk		**Sgt Watson**	November 612 uniform alpha
388	ki/suk/itk	ki/suk/itk		**Boston Mil**	yeah we shut all our traffic off at Boston center, nobody is departing, rerouting all Kennedy arrivals for all New York metro airports. I have a question for you in case we have any more aircrafts that start deviating. we need to know do you have a ?? On alert is that something you can do, just in case this happens to any more aircrafts
389	misc	misc		**Sgt Watson**	stand by I'll give the message to the commander
390	re	Re		**Sgt Watson**	major we need you to talk to him a minute
391	misc	misc		**MAJ**	go ahead
392	misc	misc		**Scoggins -**	yes ?? Scoggins, boston center military

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
				Bost Mil	
393	misc	misc		**MAJ**	yes this is major ???
394	ki/idm/kt	ki/idm/kt		**Scoggins - Bost Mil**	how you doing.. Nobody is departing Boston in all airspace Boston center, we shut all aircrafts down, rerouting New York metro airports, our only concern is that there are aircrafts in the sky and in case any more of the divert, before they start turning or whatever their gonna do, we were just wondering do you have people on alert
395			9:16:58	**13:16:58 (mp3 51:58)**	
396	suk	suk		**MAJ**	I got predators in whiskey 105 right now, I have a tanker as well, I got other aircraft on alert down at Langley, and I have trackers over JFK, over Boston and in that area right now, just looking for anything suspicious
397	ki	ki		**Scoggins - Bost Mil**	anything suspicious ok and we'll let you know about the internationals, we're not sure what were doing with them anymore at this time
398	itk	itk		**MAJ**	ok so JFK and Boston are shut down correct?
399	itk/suk	itk/suk		**Scoggins - Bost Mil**	we've shut down Boston, I'm not sure if New York center is done, any aircraft at this time in New York we are rerouting to somewhere else
400	rta	rta		**MAJ**	ok if you have anything, any of your controllers see anything, give us a yowl we'll get those fighters into that location
401	misc	misc		**Scoggins - Bost Mil**	alrighty, thank you very much

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
402	suk	suk		**Stacia**	ok we have two helicopters at New York…
403	misc	misc			* time pass*
404	misc	misc		**Sgt Watson**	new york hunters id reference American airlines 11
405	misc	misc		**Sgt Watson**	Im calling new york right now
406	misc	misc		**NYMC**	this is new york, go ahead
407	ki	ki		**Sgt Watson**	yes sir we just had knowledge that American airlines 11 is airborne headed towards Washington, did you get that information?
408	misc	misc		**NYMC**	stand by… air defense,
409					
410	idm	idm	***9:21:50***	***Nasypany***	***O.K. American Airlines is still airborne-11, the first guy. He's heading towards Washington. O.K> I think we need to scramble Langley right no. And I'm-I'm gonna take the fighters fro Otis and try to chase this guy down if I can find him.***
411					
412			9:21:58	**13:21:58 (mp3 56:58)**	
413	misc	misc		**Sgt Watson**	yes go ahead
414	itk	itk		**NYMC**	what beacon code was that
415	itk	itk		**Sgt Watson**	sir we don't have a beacon code, we only have a tail number, the last known beacon code was 1443
416	coa	coa		**NYMC**	im gonna give you a phone number and you need to call them because
417	itk	itk		**Sgt Watson**	Is this the 631-468-5959
418	itk	itk		**NYMC**	its 631-468-5959, that's the watch desk and they'll have any information you may need on this plane
419	rta	rta		**Sgt Watson**	ok if you could do me a favor and have them call us,

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					we cannot call out for some reason
420	itk	itk		**NYMC**	alright let me have your number
421	itk	itk		**Sgt Watson**	do you have dsn or no?
422	itk	itk		**NYMC**	Im sorry
423	itk	itk		**Sgt Watson**	315-334-6344
424	misc	misc		**NYMC**	alright thank you
425	itk/ki	itk/ki		**Sgt Watson**	major Anderson, what did you need?...American airlines 11, new York's gonna call me back right now with the information that they have, im just waiting…that's the first one we thought was going into the world trade center, we got a tail number and everything
426	misc	misc		**Sgt Watson**	Washington line 1
427	misc	misc		**Wash Center**	Washington
428	ki	ki		**Sgt Watson**	Washington center this is hunter id,have you been given heads up as far as the aircrafts that have crashed into the world trade center
429	itk	itk		**Wash Center**	yea we're aware of it, yes
430	itk	itk		**Sgt Watson**	well sir we're tryin to find out some information on American 11, we just got…
431	itk	itk		**Wash Center**	we don't have anything on that one
432	itk	itk		**Sgt Watson**	you do not?
433	itk	itk		**Wash Center**	do not
434	itk	itk		**Sgt Watson**	ok you are aware that he's possibly headed towards

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					Washington?
435	ki	ki		**Wash Center**	uh well we uh, we just got word from Boston or somewhere, but we don't have anything on him yet and yeah theres a lot of different things going right now
436	misc	misc		**Sgt Watson**	just wanted to give you a heads up sir
437	misc	misc		**Wash Center**	ok thank you very much
438	coa	coa			we have to get this number, this guy on the line he knows about the aircraft, American 11
439					
440	imm	imm	***9:23:15***	***Anderson***	***They're probably not squawking anything (broadcasting a beacon code) anyway. I mean, obviously these guys are in the cockpit.***
441	iic	iic		***Nasypany***	***these guys are smart***
442	imm	imm		***Unidentified male***	***yeah, they knew exactly what they wanted to do.***
444			9:26:58	**13:26:58 (mp3 1:01:58)**	
445	itk	itk		**Maj Anderson**	767 we're looking for?
446	itk	itk		**Stacia**	yes 767, tail number November 334 alpha alpha
447	ki	ki		**Sgt Watson**	copy that? Boston is missing another airplane
448	itk	itk		**Sgt Watson**	do you know any phone we can call out long distance
449	coa	coa		**Stacia**	dial this number for her
450	itk/ki	itk/ki		**Sgt Watson**	Hi this is hunters calling, I was told to give you a buzz from our mission crew commander, is there any information, I guess three aircraft out of Boston are

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					missing and apparently two of them just hit the world trade center and one is in route to Washington. Did you get that information?
451	itk/ki	itk/ki		**Sgt Watson**	yea…American 11 is not the aircraft that crashed, it is still airborne, did you get that information? That's what we just found out, we don't know where it is though. It's heading towards Washington was the last known information
452	itk	itk		**Sgt Watson**	yeah I'm not going to say much right now, just wanted to give you a heads up. Do you have any information though about where American 11 is? Or anything…
453	ki/rta	ki/rta		**Sgt Watson**	just want to say one more thing, too. Washington, I don't know if they think its serious or not but they are not, unless they hear from the centers, if you could give them a heads up and let them know….Washington center, they're not..not at all
454	coa	coa		**Stacia**	we've gotta get a plane out on that American Airline
455	ki	ki		**Maj Anderson**	we do, we got it on Langley scrambled
456	suk	suk		**Stacia**	and I'd have the President airborne, wherever
457	suk*	ki*		**Sgt Watson**	Boston has no clue where they are, he's gonna let Washington center know that this is very serious, because nobodys acting serious there
458	itk	itk		**Sgt Watson**	Boston sorry to bother you so much, this is hunters, just checking with you have you had any contact with American 11 since the last known
459	itk	itk		**Boston Center**	No

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
460				**Sgt Watson**	Conversation
461	itk/ki	itk/ki		**Boston Center**	no, we don’t have any contact at all, we do know 3 aircrafts are missing but we don't have a third call sign
462	misc	misc		**Sgt Watson**	you do not, ok if you do please give us a call
463	misc	misc		**Boston Center**	Ok
464	ki	ki		**Sgt Watson**	boston just confirmed the third aircraft but they don't know who it is, they don't know the call sign of the third one but the third one is missing...out of Boston
465	misc	misc		**Sgt Watson**	open line...hunters ID, unsecure line
466	misc	misc		**AOR**	hunters ID this is .....operations manager,
467	misc	misc		**Sgt Watson**	go ahead sir
468	bcg	bcg		**AOR**	ok I guess you called here a couple time but you haven't talked to me, if theres anything you need or anything I can help you with let me know where he is right now please
469	itk	itk		**Sgt Watson**	ok do you want me to let you know what we have going on sir?
470	itk	itk		**AOR**	yes. I have a pretty good idea, but yes
471	ki	ki		**Sgt Watson**	ok theres 3 aircraft missing out of Boston, spoke with Boston and they said they're not sure of the third aircraft call sign but they do have two, one of them is United 175 and one is American 11. They thought the American 11 was the aircraft that crashed into the world trade center with the United 175 however American 11 is not the aircraft that crashed he said the pilot on American 11 was talking to him, having a rough time telling him whats going on, there were

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					threats in the cockpit being made, this is the initial highjack information that we got American 11, Boston to Los Angeles proposed route, he was headed towards JFK at the time that they lost contact but that was not the aircraft headed into the world trade center that hit it.
472			9:31:58	**13:31:58 (mp3 1:06:58)**	
473	misc	misc		**AOR**	Ok
474	ki	ki		**Sgt Watson**	That's what Boston's saying, the last known and I'm not sure where we heard it, through the grapevine, people calling, is that American 11 was headed towards Washington, that is the only thing.
475	itk	itk		**AOR**	ok headed towards where?
476	itk	itk		**Sgt Watson**	Washington
477	misc	misc		**AOR**	Ok
478	suk/ki	suk/ki		**Sgt Watson**	So you're AOR and I just wanted to give you a heads up, the last known lat-long that we had primary target only 40-38 North, 07-43 West on American 11, but remember nothing has been confirmed as to which aircraft hit the world trade center, the other one we have his information is headed towards Washington
479	suk	suk		**Wash Center**	ok let me tell you this, we're looking, we also lost American 77
480	itk	itk		**Sgt Watson**	American 77...
481	itk	itk		**Wash Center**	excuse me?

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
482	itk	itk		**Sgt Watson**	where was he proposed to head sir?
483	itk	itk		**Wash Center**	Ok he was going to LA also
484	itk	itk		**Sgt Watson**	from where sir?
485	itk/suk	itk/suk		**Wash Center**	I think he was from Boston also, now let me tell you the story here, Indianapolis center was working this guy
486	itk	itk		**Sgt Watson**	what guy?
487	itk	itk		**Wash Center**	American 77
488	misc	misc		**Sgt Watson**	Ok
489	suk/ki	suk/ki		**AOR**	at flight level 350, however they lost radar with him, they lost contact with him, they lost everything and they don't have any idea where he is or what happened. So what we've done at the surrounding centers here is to look out for limited codes or primary targets, whatever the case may be.
490	misc	misc		**Sgt Watson**	Ok
491	ki	ki		**Wash Center**	and that was the last time, since 15 minutes ago, that I talked to the Indianapolis operations manager
492	itk	itk		**Sgt Watson**	you have a type aircraft sir?
493	itk	itk		**Wash Center**	that was a 767 I believe
494	misc	misc		**Sgt Watson**	and uh..
495	misc	misc		**Wash Center**	somebody is talking, I'm sorry I can't hear you, in the background
496	itk	itk		**Sgt Watson**	all I need is the last lat-long position of the 767

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
497	itk/ki	itk/ki		**Wash Center**	I don't know that was Indie center but they said it was somewhere, last time I talked to them, East of York and I don't even know what state that is.
498	coa	coa		**Sgt Watson**	ok sir well I'm gonna go ahead and give them a call.
499	misc	misc		**Wash Center**	Ok
500	misc	misc		**Sgt Watson**	thank you sir.
501					*calling*
502	misc	misc		**Indie Center**	indie center
503	itk	itk		**Sgt Watson**	Indianapolis, hunters ID calling, American 77, we have heard information regarding this aircraft, you have last known position?
504	itk	itk		**Indie Center**	im sorry say it again
505	itk	itk		**Sgt Watson**	you have the last known position of American 77
506	itk	itk		**Indie Center**	Yes
507	itk	itk		**Sgt Watson**	could I have it?
508	itk	itk		**Indie Center**	yes, YRK080 at 010
509	itk	itk		**Sgt Watson**	and is there a lat long sir?
510	itk	itk		**Indie Center**	I don't have a lat-long right here…do you want an approximate location?
511	itk	itk		**Sgt Watson**	Yeah
512	itk	itk		**Indie Center**	it would be Henderson, hnn
513	itk	itk		**Sgt Watson**	I don't know where that is either sir

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
514	itk	itk		**Sgt Watson**	any last known position of that aircraft if at all possible, this is a very serious matter as you know
515	itk	itk		**Indie Center**	yea he was at 35,000 feet and off the Henderson
516	itk	itk		**Sgt Watson**	off the Henderson sir?
517	itk	itk		**Indie Center**	yea he was about 35 west of Henderson, HNN
518	itk	itk		**Sgt Watson**	ok I don't know where that is can you anyway get me a lat-long?
519			9:36:58	**13:36:58 (mp3 1:11:58)**	
520	itk	itk		**Indie Center**	yeah just a moment…..ok you ready?
521	misc	misc		**Sgt Watson**	go ahead sir
522	itk	itk		**Indie Center**	its 3841 North, 08252
523	itk	itk		**Stacia**	08252 west
524	misc	misc		**Indie Center**	Right
525	itk	itk		**Stacia**	whens that last update sir?
526	itk	itk		**Indie Center**	that is where we saw him approximately 12:56z
527	misc	misc		**Sgt Watson**	Thanks
528	itk	itk		**MAJ**	heading in speed
529	itk	itk		**Sgt Watson**	there asking for a heading in speed for that aircraft
530	itk	itk		**Indie Center**	he was heading westbound approximately 270 and I don't know his speed at this point.

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
531	itk	itk		**Sgt Watson**	last known speed you had?
532	itk	itk		**Indie Center**	um we haven't gotten that information off of the….
533	itk	itk		**Sgt Watson**	ok is this aircraft still airborne is what I'm trying to…
534	itk	itk		**Indie Center**	we don't know we cannot find it
535	misc	misc		**Sgt Watson**	thank you…if we need anything else we'll give you a call
536	misc	misc		**Indie Center**	Ok
537	itk/coa	itk/coa		**Stacia**	bravo 112 is that plane out…lets bring up bravo 112
538	itk	itk		**Sgt Watson**	its in a zero extrapolated OAR
539	coa	coa		**Stacia**	ok tell them that z point that we have on them right now
540	itk	itk		**Sgt Watson**	is American 77 last known position
541	suk	suk		**Sgt Watson**	Delta 89 that's a highjack…they think it's a possible highjack….South of Cleveland, we have a code on him though
542	coa	coa		**Stacia**	good pick it up! Find it!
543	ki	ki		**Sgt Watson**	we're picking it up right now.
544	ki	ki		**Stacia**	89..Boeing 767
545	suk	suk		**Sgt Watson**	…supposed to go to Vegas
546	itk	itk		**Stacia**	ok whats the special number
547	itk	itk		**Stacia**	what do you have it on, just leave it right there
548	itk	itk		**Sgt Watson**	zero 89
549	ki	imm		**Stacia**	Bravo 089 is our Delta 89
550	ki	ki			that's another highjack, Bravo 089 is the track
551	coa	coa			let's make that a special 15 and PA that real world,

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					please
552	itk	itk		**Stacia**	do they have a possible destination of that Delta 89, he's headed to Las Vegas
553	itk	itk		**Sgt Watson**	headed to Pentagon
554	misc	misc			*dialing*
555	misc	misc		**Pentagon Center**	Penty center
556	itk/ki/suk	itk/ki/suk		**Sgt Watson**	Indianapolis Hunters, reference Delta 89, do you know any information about that aircraft? I wanted to give you a heads up this is another highjacked aircraft…Boston to Las Vegas, he's on a mode 3 of 1304, we still have contact via…
557	itk	itk		**Pentagon Center**	what was the number again
558	itk	itk		**Sgt Watson**	Delta 89, 767 out of Boston heading to Vegas, he's on a mode 3 of 1304, I have the last lat-long if you need it
559			9:41:58	**13:41:58 (mp3 1:16:58)**	
560	misc	misc		**Pentagon Center**	go ahead
561	itk	itk		**Sgt Watson**	lat-long 4121 north 08215 West
562	misc	misc		**Pentagon Center**	Ok
563	ki*	tmm*		**Sgt Watson**	just to give you a heads up that's all we right now but he is confirmed highjacked
564	itk	itk		**Pentagon Center**	ok we're not showing him in our system at this point, you are tracking him you say?

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
565	itk/ki	itk/ki		**Sgt Watson**	we have him on the radar sir but he is headed your way
566	itk*	tmm*		**Pentagon Center**	he is headed our way?
567	itk*	tmm*		**Sgt Watson**	Delta 89
568	itk	itk		**Pentagon Center**	ok, he headed off of Boston to LAX right?
569	itk	itk		**Sgt Watson**	LAS…I got Vegas sir, whatever Vegas is
570	suk	suk		**Pentagon Center**	ok LAS, ok because we're not showing him in the system anywhere
571	itk	itk		**Sgt Watson**	ok he's on a…do you have mode 3 capability or anything?
572	itk	itk		**Pentagon Center**	he's on a 1304 code?
573	misc	misc		**Sgt Watson**	Correct
574	imm	coa		**Pentagon Center**	ok we'll bring that up
575	imm	coa		**Sgt Watson**	alright sir
576	imm	coa		**Pentagon Center**	thank you
577	imm	coa		**Sgt Watson**	ok sir
578				**(mp3 01:17:52)**	
579					*dialing*
580	misc	misc		**Cleveland Center**	Cleveland Military...
581	tsu*	tmm*		**Sgt Watson**	Cleveland military, Hunters ID...we are obviously having a pretty bad situation with an aircraft I wanted to give you a heads up

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
582	itk	itk		**Cleveland Center**	Did they get into the...hold on please.
583	misc	misc			ok go ahead
584	ki/suk	ki/suk		**Sgt Watson**	yes sir, Delta airlines 89 is a highjack, it is your sector currently right now, mode 3 1304, we're not sure if his intentions..
585	misc	misc		**Cleveland Center**	hold on, hold on...I want you to talk to...
586	misc	misc		**Sgt Watson**	go ahead sir transfer me out
587	misc	misc		**Cleveland Center**	Hello
588	ki/kt	ki/kt		**Sgt Watson**	Hello this is Hunters ID, I wanted to give you a heads up in your center, currently we have Delta 89, its a 767 out of Boston headed for Las Vegas, last known now a confirmed highjack on a mode 3 of 1304 and he is in your center, as you know we have about five aircrafts currently that are missing out of Boston, two of them into the World Trade Center, now Washington has confirmed near the White House, so this apparently is pretty serious, this is Delta 89, I'm not sure what his intentions are but if you have any...I'm sorry 1989, I just got knowledge
589	tsu	tsu		**Cleveland Center**	1989 is the confirmed highjack ok.
590	misc/itk	misc/itk		**Sgt Watson**	ok ma'am anything that you have please call us, do you have our number?
591	misc	misc		**Cleveland Center**	you know what I'm gonna let you give it to someone else, I'm gonna go take care of this.

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
592	misc	misc		**Sgt Watson**	Ok
593	itk	itk		**Cleveland Center**	ok Delta 1989, confirmed highjacked, code is 1304 correct
594	itk	itk		**Sgt Watson**	yea it's a 767, Boston to Las Vegas
595	ki	ki		**Cleveland Center**	767, Boston to Las Vegas
596	ki/tmm	ki/tmm		**Sgt Watson**	And apparently we're keeping an eye on this aircraft, obviously now that it's a highjack, the other aircraft problem….
597	misc	misc		**Cleveland Center**	1989..
598	rta	rta		**Sgt Watson**	ok sir if you have any other information I'd like to give you a number to call
599	misc	misc		**Cleveland Center**	ok go head
600	ki	ki		**Sgt Watson**	315-334-6311, that's the mission crew commander
601	itk	itk		**Cleveland Center**	ok and who would that be
602	itk	itk		**Sgt Watson**	major Nasypany
603	itk	itk		**Cleveland Center**	major Nasypany..
604	itk	itk		**Sgt Watson**	major Nasypany
605	misc	misc		**Cleveland Center**	ok major Nasypany
606	misc	misc		**Sgt Watson**	if theres any deviation from the uh…
607	misc*	itk*		**Cleveland Center**	ok you said you're tracking him right now, while we are
608	suk	suk		**Sgt Watson**	we have him on radar sir that's about all right now, we

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					have all our fighters out over the other aircraft
609	itk	itk		**Cleveland Center**	you send fighters out?
610	itk	itk		**Sgt Watson**	uh negative on the Delta 1989, let me just check with the mission crew commander
611			9:46:58	**13:46:58 (mp3 1:21:58)**	
612	misc	misc		**Cleveland Center**	Ok
613	itk	itk		**Sgt Watson**	Cleveland center is wondering if theres any aircraft after the Delta 1989…
614	itk	itk			we're in the process of trying to get some aircraft up there sir,
615	itk	itk		**Cleveland Center**	ok could you please get back to me if you do launch your craft out there please?
616	itk	itk		**Sgt Watson**	I certainly will
617	misc	misc		**Cleveland Center**	ok thank you
618	coa	coa		**Sgt Watson**	watch for any deviations and call us if you see it sir
619	misc	misc		**Cleveland Center**	I understand
620				**(mp3 1:22:37)**	
621	suk/itk	suk/itk		**Sgt Watson**	pentagon got hit you heard that?
622	itk	itk		**Stacia**	WHAT
623	itk	itk		**Sgt Watson**	pentagon just got hit
624	ki	ki		**h3**	we're trying to get Toledo after this delta

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
625	misc	misc		**Sgt Watson**	open line, hunters id on secure line
626	suk/itk	suk/itk		**Wash Center**	hey hunters id Washington center, I got a 777 code just came out of a restricted area at 23,000 feet, he's about 15 miles East of Nottingham, I need to know if anybody knows about that aircraft hes at 23,000 feet
627	ki	ki		**Sgt Watson**	sir stand by it might be our fighters, please stand by
628	itk/itk	itk/itk			Joe can you confirm that code, is that our fighters?...this is Washington center…the triple 7 code is that our fighters?
629	itk	itk			I believe those are our fighters stand by sir….they are fighters sir I believe outside of Atlantic city, Otis I'm sorry sir.
630	itk	itk		**Wash Center**	So approximate 10 miles due East of Nottingham 23, that's your fighters?
631	itk/suk	itk/suk		**Sgt Watson**	Stand by, they're out of Langley and those are our fighters, theres 3 birds headed your way.
632	misc	misc		**Wash Center**	ok great thanks a lot
633	misc	misc		**Sgt Watson**	your welcome
634					*hangs up*
635	itk	itk		**Sgt Watson**	Did you copy threat-con Charlie?
636	itk	itk			OK you said out of Toledo?
637	itk	itk		**h3**	yeah we're tryin to scramble out of Toledo, we don't know if we can get them out or no
638	itk	itk		**Sgt Watson**	who is that, is that our air force?
639	itk	itk		**h3**	Yea
640					*dialing*
641	misc	misc		**Cleveland**	Cleveland military

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
				Mil	
642	misc	misc		**Sgt Watson**	Hunters ID calling, referencing the track that's headed your way Bravo 089, the special 15
643	itk	itk		**Cleveland Mil**	the what now?
644	iic	suk		**Sgt Watson**	they have a highjacked aircraft, sorry I'm talking military I wanted to give you a heads up we are trying to get Toledo airborne after this aircraft
645	misc	misc		**Cleveland Mil**	Ok
646	misc	misc		**Sgt Watson**	because someone wanted me to tell them if we were..
647	itk	itk		**Cleveland Mil**	yes that was me, do you know when they're gonna launch, you think?
648	itk	itk		**Sgt Watson**	let me just check
649	suk	suk		**Sgt Watson**	that track just took a hard right turn sir, just to give you a heads up
650	ki	ki		**Cleveland Mil**	we are tracking there
651	itk	itk		**Sgt Watson**	all I know is, I was told out of Toledo, let me just check
652	itk	itk			Cleveland centers wondering out of Toledo how long
653	itk	itk		**Cleveland Center**	they're launching aircraft right now off Toledo
654	itk	itk		**Sgt Watson**	negative sir, they're trying, they don't have anybody out…sir
655	misc	misc		**Cleveland Center**	ok yea go ahead
656	itk/ki	itk/ki		**Sgt Watson**	they're trying, they don't have anybody yet, they're trying out of Toledo and sir he's headed a hard

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					right…has been body got a hold of this..
657	itk	itk		**Sgt Watson**	no confirmed
658	itk	itk		**Cleveland Center**	its not confirmed they're tryin to launch him…ok alright I got that
659	itk	itk		**Sgt Watson**	sir they are not confirmed yet
660	misc	misc		**Cleveland Center**	alright, please get back to me
661	misc	misc		**Sgt Watson**	thanks I will
662	misc	misc			*hang up*
663			9:51:58	**13:51:58 (mp3 1:26:58)**	
664	rta/misc*	misc*		**Sgt Watson**	Toledo, they're trying…Raymond if you want to have a seat and write all the information down that I have, I'll show you then we'll go from there, that way you'll have it on paper…I think we're screwed…I'm worried about us now
665	misc	misc		**Raymond**	we're small potatoes right now, they're not gonna go after the military other than the Pentagon
666	misc	misc		**Sgt Watson**	Stacia if we hear anything Cleveland center would obviously like us to call them
667	misc	misc		**Stacia**	Cleveland center, tell them that…
668	misc	misc		**Sgt Watson**	I already did…Toledo..yea
669	itk	itk		**Stacia**	are they watching him
670	itk	itk		**Sgt Watson**	yeah they just saw a hard right, right when you said it
671	misc	misc		**Stacia**	in that book we used to have a book of important places..

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
672	rta	rta		**Sgt Watson**	ok I'm going to have Raymond write all this stuff down
673					*repeating info on flights*
674				**(mp3 1:30:40)**	
675			9:57:20	**13:57:20**	*time repeating in in 5 second increments*
676					*no sound*
677				**(mp3 1:37:01)**	
678	misc	misc		**Sgt Watson**	Hunters ID calling, wanted to give you a heads up on the Delta 1989
679	suk/ki*	tmmd*			Cleveland center OAR hes was giving you the information that he was highjacked aircraft, he is not a highjacked aircraft he's taking precautionary measures and he's landing at Cleveland center, however we do have four fighters launched on that aircraft just to be sure
680	itk	itk		**unknown**	its Delta 1989…the 1403 code?
681	suk/tmm	suk/tmm		**Sgt Watson**	just wanted to give you a heads up, he's headed to Cleveland center to land, he is not confirmed a highjack
682	misc	misc		**unknown**	thank you
683	misc	misc			*dialing*
684	misc	misc		**Canada**	good morning..
685	suk/itk	suk/itk		**Sgt Watson**	Hunters ID calling, heads up theres a possible aircraft that took off out of Canada somewhere headed to Washington, do you know of any information that you can give to us on that
686	itk	itk		**Canada**	stand by please …(talking to own) one headed from Canada to Washington?

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
687	itk	itk		**Corp Nickelson - Canada**	Yes Hunters, this is Corp. Nickelson
688	ki/itk	ki/itk		**Sgt Watson**	hi, just checking, apparently we got confirmation that theres an aircraft came out of Canada headed for Washington, do you know any information on that aircraft, as far as it coming into our AOR
689	itk	itk		**Corp Nickelson - Canada**	I saw something on the jack, that's all I got on that, you couldn't give me a position on that, could you..
690					
691	itk	itk		**Sgt Watson**	we don't know where he is, that's what we were tryin to get from you, what did you see on that chat?
692	itk	itk		**Corp Nickelson - Canada**	just that theres a possible, our intel says theres a possible aircraft, im gonna try to follow up with that information, I'll get back to you as soon as possible
693	misc	misc		**Sgt Watson**	ok thank you
694	694	694			*hang up*
695				**Sgt Watson**	hunters ID secure line
696	ur	ur		**Cleveland Center**	I believe I was the one talking about that delta 1989, well disregard that, did you…
697	ur	ur		**Sgt Watson**	what we found out was that he was not a confirmed highjack
698	itk/suk	itk/suk		**Cleveland Center**	ok I don't want you to worry about that right now, we got a United 93 out there, are you aware of that?...theres a bomb on board
699	itk/itk/ur	itk/itk/ur		**Sgt Watson**	a BOMB onboard? And this is confirmed? Do you have a mode 3 sir?

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
700	suk/itk	suk/itk		**Cleveland Center**	No we lost his transponder, what we wanna know is did you scramble airplanes so that delta 1989
701	itk	itk		**Sgt Watson**	we did out of Suffridge and Toledo sir,
702	itk	itk		**Cleveland Center**	did you? Are they in the air?
703	itk	itk		**Sgt Watson**	yes they are
704	itk	itk		**Cleveland Center**	is there any way we can get them to where this United is?
705			10:06:58	**14:06:58 (mp3 1:41:58)**	
706	itk	itk		**Sgt Watson**	ok what I'm gonna have you do…can you give me a lat-long on that aircraft?
707	itk	itk		**Cleveland Center**	(talking to own) what was the last position of that United?
708	itk	itk			West Mooreland…that's West Mooreland airport, that's in the Pittsburg area
709	itk	itk		**Sgt Watson**	Pittsburg area?
710	itk	itk		**Cleveland Center**	Yes
711	itk	itk		**Sgt Watson**	we have no point for LBE sir, do you have a lat-long?
712	itk	itk		**Cleveland Center**	no I don't got that available right now
713	itk	itk		**Sgt Watson**	do you know where he was going or coming from?
714	itk	itk		**Cleveland Center**	he was…ok..all I know is..
715	itk	itk		**Sgt Watson**	whatever you have sir

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
716	itk	itk		**Cleveland Center**	all I know is hes a united 93, he has a confirmed bomb onboard and right now his last known position was in the west Mooreland area,
717	itk	itk		**Sgt Watson**	west Mooreland, in the Pittsburg, Pennsylvania area?
718	itk	itk		**Cleveland Center**	the Pittsburg, Pennsylvania area
719	itk	itk		**Sgt Watson**	what this confirmation talking to the pilot
720	itk	itk		**Cleveland Center**	it came on the frequency
721	itk	itk		**Sgt Watson**	on the frequency sir
722	misc	misc		**Cleveland Center**	ok I got two people talking right now
723				********** ********** *	*split to diff call*
724	misc	misc		**h6**	hunters id …
725	ki/itk	ki/itk		**Corp Wilson**	yes its corp Wilson, sidecar id, I got that call from you guys about that stolen aircraft and you guys wanted us to call up And check up on it, we don't have a call sign or mode 3 or anything, we just wondered if you guys had any further intel on this
726	itk	itk		**h6**	we don't have anything, that's why were calling you
727	itk	itk		**Corp Wilson**	absolutely no position or anything?
728	itk	itk		**h6**	just the same thing you guys saw on the chat line
729	itk	itk		**Corp Wilson**	ok alright we'll keep trying on our end and we'll let you know as soon as we have anything
730	misc	misc		**h6**	thank you very much

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
731				********** ********** *	*split back to previous call with Sgt Watson*
732	itk	itk		**unknown**	6 West
733	itk	itk		**Sgt Watson**	ok 3159 N 07846 W
734	itk	itk		**Cleveland Center**	Yes
735	itk	itk		**Sgt Watson**	do you have any confirmation of any highjackers on board at all?
736	itk	itk		**Cleveland Center**	all we know is that we heard him say he's got a bomb onboard
737	misc	misc		**Sgt Watson**	thank you sir
738	coa	coa		**Cleveland Center**	get those aircrafts scrambled towards him
739	ki/suk	ki/suk		**Sgt Watson**	sir we're working it right now, we've got 6 aircrafts so far but we're working it and we will
740	misc	misc		**Cleveland Center**	Ok
741	itk	itk		**Sgt Watson**	what center is this
742	itk	itk		**Cleveland Center**	this is Cleveland center
743	misc	misc		**Sgt Watson**	let me just check, stand by 1
744	misc	misc			checking with weapons sir stand by
745	misc	misc		**h6**	Hunters
746	misc	misc		**Corp Nickelson - Canada**	yes northeast, this is corp Nickelson…be advised our intelligence people…
747	misc	misc		**h6**	Yes

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
748	suk/tmm	suk/tmm		**Corp Nickelson - Canada**	that we're that our int is not assessing theres a actual aircraft problem, its that there could be problems from our area, theres no actual aircraft that we suspect could be a danger
749	itk	itk		**h6**	its just a possibility
750	itk	itk		**Corp Nickelson - Canada**	our int is suggesting just a possibility, they don't have any particular aircraft in mind.
751	misc	misc		**h6**	ok copy that
752	misc	misc			*dial*
753	suk/ki/co a	suk/ki/co a		**Sgt Watson**	Hunters ID, just wanted to give you a heads up, the zero point Bravo 424, is the last known position of the United 93, the one with the bomb on board, just so you know, and we are gonna go ahead and make it a special
754	misc	misc		**Cleveland Center**	thank you
755	misc	misc			*hang up*
756			10:11:58	**14:11:58 (mp3 1:46:58)**	
757	misc	misc		**2**	secure line
758	misc	misc		**Wash Center**	hey hunters, Washington center
759	misc	misc		**Sgt Watson**	go ahead
760	itk	itk		**Wash Center**	hey listen I got some fighters over the top of the Nottingham area and they need the frequency ?? With the tank…got any ideas, the tanker needs the frequency
761	itk	itk		**Sgt Watson**	standee by we'll get it for you sir

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
762	misc	misc		**Wash Center**	Alright
763	misc	misc		**Sgt Watson**	I also wanted to give you a heads up Washington….
764	misc	misc		**Wash Center**	go ahead
765	itk	itk		**Sgt Watson**	United 93 have you got information on that that yet?
766	itk/suk	itk/suk		**Wash Center**	yea he's down
767	itk	itk		**Sgt Watson**	he's down!?....when did he land, 'cause he just…
768	suk	suk		**Wash Center**	he did not land
769	itk	itk		**Sgt Watson**	oh he's down…
770	suk	suk		**Wash Center**	yes, somewhere up northeast of Camp David
771	itk	itk		**Sgt Watson**	Northeast of Camp David
772	itk	itk		**Wash Center**	that's the last report, I don't know exactly where
773	itk	itk		**Sgt Watson**	sir but not confirmation of a blow up or anything like that?
774	itk	itk		**Wash Center**	yes we have a c130 over there and he says yes its on the ground
775	itk	itk		**Sgt Watson**	on the ground safe?
776	itk	itk		**Wash Center**	no, negative
777	itk	itk		**Sgt Watson**	alright sir, Northeast of Camp David
778	itk	itk		**Wash Center**	yeah I need a tanker frequency
779	itk	itk		**Sgt Watson**	sir we're tryin to get that right now

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
780	itk	itk		**Sgt Watson**	the frequency for the aircraft you said, I got my mission commander listening right now, sir what say it again
781	itk	itk		**Wash Center**	ok I have a tanker over Patoxin, Nottingham area, a DC10, flying around and he need a tanker frequency to refuel…never mind we got it, disregard
782	misc	misc		**Sgt Watson**	alright, disregard
783			10:16:58	**14:16:58 (mp3 1:51:58)**	
784	itk	itk		**Wash Center**	hey hunters, its Washington, someone ask me for the coordinates for the white house
785	misc	misc		**Sgt Watson**	go ahead
786	itk	itk		**Wash Center**	ok this is pretty close, its 3853 N 07702 W
787	itk	itk		**Sgt Watson**	ok you got a call for the coordinates for the White House
788	itk	itk		**Wash Center**	yes someone from hunters called and asked for them
789	misc	misc		**Sgt Watson**	ok I'll pass it
790	misc	misc		**Sgt Watson**	Hunters ID secure line
791	ki	ki		**Oak Grove**	yes ma'am this is ?? From Oak Grove, New York Amos just passed us information on an unidentified aircraft headed your way and I just wanted to make sure you have the same information or lat-tel gave that information
792	ki/itk	ki/itk		**Sgt Watson**	ok I'm not seeing lat-tel at all, we have that blocked, what information do you have?
793	itk	itk		**Oak Grove**	ok he is currently…let me get you a current

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					position…he is currently at position 4103 N 6727 W
794	itk	itk		**Sgt Watson**	and what aircraft is this?
795	itk	itk		**Oak Grove**	this came from new york amos, its unknown unidentified, its not talking to them
796	itk	itk		**Sgt Watson**	they don't know who it is
797	itk	itk		**Oak Grove**	its squawking a mode 3 of…4651...do you see somebody out there on a 4651?
798	itk	itk		**Sgt Watson**	4651 mode 3?
799	itk	itk		**Oak Grove**	yes ma'am, 4651
800	misc	misc		**Sgt Watson**	4651 copy thank you
801	itk	itk		**Sgt Watson**	do you have a call sign for the aircraft?
802	itk	itk		**Oak Grove**	you need to coordinate with New York..
803	ki	ki		**Sgt Watson**	ok Amer? Hasn't contacted us on a 4651
804	ki/rta	ki/rta		**Oak Grove**	they are completely unidentified on it, if you could talk to them
805	misc	misc		**Sgt Watson**	thank you
806	misc	misc		**Oak Grove**	Thanks
807	misc	misc		**Sgt Watson**	hunters id, on secure line
808	misc	misc		**Cleveland Center**	Cleveland center military, referencing united…
809	misc	misc		**Sgt Watson**	stand by sir, we've got too many people talking
810	itk	itk		**Cleveland Center**	reference to United 93, do you know
811	itk/ki	itk/ki		**Sgt Watson**	yes United 93, I guess we got confirmation that, that particular aircraft when down Northeast of Camp David
812	itk	itk		**Cleveland Center**	that's correct

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
813	itk	itk		**Sgt Watson**	and that's it
814	itk	itk		**Cleveland Center**	yea, right
815	itk	itk		**Sgt Watson**	that's all we have
816	itk	itk		**Cleveland Center**	do you know the exact position of that?
817	itk	itk		**Sgt Watson**	last known position, I believe, yes I do have it, stand by I wanna give you the right one, 3159 N 07846 W
818			10:21:58	**14:21:58 (mp3 1:56:58)**	
819	itk	itk		**Cleveland Center**	07846W, is exactly where he went down
820	itk	itk		**Sgt Watson**	that was the last known position, Northeast of Camp David
821	itk	itk		**Cleveland Center**	Northeast of Camp David, ok thank you
822	misc	misc		**Sgt Watson**	ok sir
823					*fade into call*
824	itk/ki	itk/ki		**Sgt Watson**	all I have is a lat-long sir and a mode 3 of 4651
825	itk	itk		**unk**	what was the mode 3
826	itk	itk		**Sgt Watson**	we got a mode 3 of 4651
827	itk	itk		**unk**	4651, hold on a second
828	itk	itk			do you know who made the inquiry?
829	itk/suk	itk/suk		**Sgt Watson**	we got the call from Southeast, not sure, they said New York called inquiring about an aircraft on a certain lat-long, and we brought it up, we do have a swordfish aircraft out there, I'm not sure if it's the same one

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					you're talking about
830	ki	ki		**unk**	ok what we're showing, we're showing a 4625, mode 3 indicating 11,300
831	ki	ki		**Sgt Watson**	ok sir that's one of our aircraft
832	itk	itk		**unk**	that's one of yours?
833	itk	itk		**Sgt Watson**	not one of ours but it's a swordfish
834	misc	misc		**unk**	ok alright thanks
835	itk	itk		**Sgt Watson**	is that the one you were inquiring about sir?
836	itk	itk		**unk**	well I didn't personate the inquiry, I didn't make the inquiry, I'll uhh
837					
838	misc	misc		**Sgt Watson**	if theres anything else you can call us
839					
840	misc	misc		**unk**	alright thanks
841	misc	misc		**Sgt Watson**	id, secure line
842	suk	suk		**Cleveland Center**	yes we got a sting out of Toledo, right now that we're talking to, is that the aircraft
843					*call cuts*
844	misc	misc		**Sgt Watson**	Hunters ID
845	itk	itk		**Cleveland Center**	reference that sting, you said he striked 320.0 what was the other one you said?
846	itk	itk		**Sgt Watson**	he's gonna up on 364.2
847	itk	itk		**Cleveland Center**	364.2?
848	itk	itk		**Sgt Watson**	364.2
849			10:26:58	**14:26:58 (mp3**	

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
				2:01:58)	
850	misc	misc		**Sgt Watson**	Hunters ID on secure line
851	suk	tmmd		**Alexander**	Hi hunters its, ?? Alexander, Air Force One is South of Tallahassee now, he's on a 3755 code
852	tsu	tsu		**Sgt Watson**	yea we have him, thank you
853	suk	tmmd		**Alexander**	he's our track Charlie
854	misc	misc		**Sgt Watson**	Hunters ID
855	misc	itk		**Cleveland Center**	yes reference the sting, he tried
856	suk	suk		**Sgt Watson**	alright weapons is right here sir, stand by one……stand by please…ok Hunters is going to try to contact them sir, if they continue to not be able to hear them, they're coming up on frequency 328.0 and 364.0
857	ki	ki		**Cleveland Center**	he's already tried both those, ok
858	misc	misc		**Sgt Watson**	Ok
859	itk	itk		**Cleveland Center**	ok look I got two people talking, who am I talking with?
860	itk	itk		**Sgt Watson**	Sgt Watson
861	itk	itk		**Cleveland Center**	ok he has already tried both those frequencies, he wants to know what he needs to do right now
862	itk	itk		**Sgt Watson**	ok stand by….hunters is talking to sting, standby 1 let me confirm that
863	misc	misc		**Cleveland Center**	Please
864	ki/itk	ki/itk		**Sgt Watson**	ok they're coming up on 355.2 did you copy that?
865	itk	itk		**Cleveland**	355.2

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
				Center	
866	itk	itk		**Sgt Watson**	355.2
867	misc	misc		**Cleveland Center**	Ok
868	misc	misc		**Sgt Watson**	thank you sir
869	misc	misc		**Cleveland Center**	Alright
870	itk	itk		**h2**	air force one?
871	itk	itk		**unknown**	Correct
872	itk	itk		**h2**	going to Andrews?
873	itk	itk		**unknown**	going to Andrews
874	itk	itk		**h2**	from where please
875	itk	itk		**unknown**	from FRQ
876	itk	itk		**h2**	FRQ?
877	misc	misc		**Sgt Ginoble**	Hunters ID, Sgt Ginoble
878	misc	misc		**unk**	**(not understandable)**
879	misc	misc		**Sgt Ginoble**	?/? 51
880	misc	misc			eh?
881	misc	misc			Delta, yes its your 213
882	itk	itk		**Sgt Ginoble**	they're friendly?
883	itk	itk		**unk**	they are friendly, it’s a gold 99 and New York knows about it and everything and it had to get up
884	ki	ki		**Sgt Ginoble**	they're friendly aircraft
885	ki	ki		**unk**	yeah it has a mode 2
886	itk	itk		**h2**	gold you said?
887	itk	itk		**unk**	gold, like silver and gold, 99
888	ki	ki		**unk**	we're assuming theres 4, he said theres a mission, he was very very brief 'cause he had to go

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
889	itk	itk		**h2**	New York told you this?
890	itk	itk		**unk**	New York told me this, yes, New York Amos
891	itk	itk		**h2**	you don't know where they're coming from
892	itk/ki	itk/ki		**unk**	they didn't tell me anything, all I can tell you right now is they're ok and they're coming.
893	misc	misc		**Sgt Ginoble**	ok thank you very much
894	misc	misc		**unknown**	ok thank you bye!
895			10:31:58	**14:31:58 (mp3 2:06:58)**	
896	misc	misc		**Sgt Ginoble**	Hunters ID Sgt Ginoble
897	ki/itk	ki/itk		**Cleveland Center**	uh yea reference that sting, he tried two and that didn't work either what do you want him to do
898	itk	itk		**Stacia**	who is this
899	itk	itk		**Cleveland Center**	Cleveland
900	itk	itk		**Sgt Ginoble**	Cleveland?
901	itk	itk		**Cleveland Center**	Yea
902					*static in audio*
903	itk	itk		**Stacia**	Cleveland are you on?
904	itk	itk		**Cleveland Center**	yea, do you want to pass something to sting? We're talking to him, we're the only ones talking to him right now. What would you like us to pass to him? What do you want him to do?
905	itk	itk		**Stacia**	ok, I understand, I'm gonna get a specific and have our captain talk to you that way we could get control of him, ok?

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
906	itk	itk		**Cleveland Center**	that's fine
907	re	re		**Stacia**	Maj Prodder…this guy wants to talk to you so he can tell these pilots what you want them to do
908	coa	coa		**Stacia**	Cleveland they want them to cap at their present position
909	itk	itk		**Cleveland Center**	they want them to do what?
910	itk	itk		**Stacia**	Cap
911	itk	itk		**Cleveland Center**	what do you mean cap
912	itk	itk		**Stacia**	what they want them to do is circle right there in their present position
913	misc	misc		**Cleveland Center**	Alright
914	misc	misc		**Stacia**	ok? Thank you
915					*hang up*
916	itk/rta	itk/rta		**Stacia**	did we try unknown rider on the position? Lets try unknown rider
917	misc	rta		**Stacia**	we're gonna try unknown rider on them
918	itk	itk		**Sgt Watson**	are we on guard
919	iic	iic		**Stacia**	Unknown rider, unknown rider at position 4123 N 06532 W, this is hunters on guard, 283 S kilo, unknown rider, unknown rider
920	itk	itk		**Stacia**	still want them to authenticate?
921	iic/coa	iic/coa		**Stacia**	Unknown rider, unknown rider, authenticate 283 s kilo.
922	iic	iic		**Stacia**	they're not answering
923	iic	iic		**Stacia**	unknown rider, at position…

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
924	iic	iic		**Stacia**	they're not authenticating
925	iic	iic		**Stacia**	*repeating unknown rider*
926			10:36:58	**14:36:58 (mp3 2:11:58)**	
927	misc	misc		**h2**	open line
928	itk	itk		**Cleveland Center**	this is Cleveland center again, any update on that one that went down, there in Pennsylvania?
929	itk/ki	itk/ki		**h2**	uh negative sir that it's united 93, there was a bomb on board and confirmed Northeast of Camp David when it went down
930	misc	misc		**Cleveland Center**	ok alright thank you
931	misc	misc			*hang up*
932	misc	misc	10:41:58	**14:41:58 (mp3 2:16:58)**	
933	coa	coa		**h2**	gold 99, gold 99, this is hunters authenticate
934	coa	coa		**???**	go ahead id
935	itk/imm	itk/imm		**h2**	as far as authentication goes, how far out, those four ships coming in the Canada east, how far out should they be able to hear us? Because nobody is coming back with authentication, we're tryin to find the range
936	itk	itk		**??**	they should be able to hear you as far out as the radio coverage goes
937	ki	ki		**h2**	yup and they're within that
938			10:46:58	**14:46:58 (mp3**	

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
				2:21:58)	
939	misc	misc		**Sgt Ginoble**	Hunters ID, Sgt Ginoble?
940	itk	itk		**Cleveland Center**	Hunters, this is Cleveland center, can you identify if you have any known military aircrafts in the Northeast corner of Misty
941	itk	itk		**Sgt Ginoble**	Misty?
942	itk	itk		**Cleveland Center**	yea any known military aircraft
943	itk	itk		**Sgt Ginoble**	northeast area, stand by
944	misc	misc		**Cleveland Center**	Hello
945	itk	itk		**Cleveland Center**	I need to know if you have any military aircraft in misty
946	itk	itk		**Sgt Ginoble**	that's what we're doing stand by….yes we do
947	itk	itk		**Cleveland Center**	can you give me their codes please
948	itk	itk		**Sgt Ginoble**	Standby
949	itk	itk		**Sgt Ginoble**	4671, 4657 and 4617, 4 aircraft total
951	itk	itk		**Cleveland Center**	give them to me again please
952	itk	itk		**Sgt Ginoble**	4671, 4657
953	itk	itk		**Cleveland Center**	4657
954	itk	itk		**Sgt Ginoble**	and 4617
955	itk	itk		**Cleveland Center**	4617…not a 5617?
956	misc	misc		**Sgt Ginoble**	not on their hands
957	itk	itk		**Cleveland**	4617, 4657, 4671, that's all you got that's only 3

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
				Center	
958	itk	itk		**Sgt Ginoble**	theres 4 ships out there
959	itk	itk		**Cleveland Center**	whats the fourth one?
960	misc	misc		**Sgt Ginoble**	Standby
961	misc	misc		**Sgt Ginoble**	they only have three codes available here, whoever the fourth guy is…
962	misc	misc		**Cleveland Center**	this is not a routine mission is it?
963	misc	misc		**Sgt Ginoble**	standby….what frequency can we reach you at
964			10:51:58	**14:51:58 (mp3 2:26:58)**	
965	misc	misc		**Cleveland Center**	frequency…you don't need to reach us we just need to know the frequency
966	misc	misc		**Sgt Ginoble**	whos calling again?
967	misc	misc		**Cleveland Center**	Cleveland
968	misc	misc		**Sgt Ginoble**	ok we're gonna see if we can get weapons give you a call, they're the ones who have all the information
969	coa/itk	coa/itk		**Cleveland Center**	ok you get a hold of them, have them give us a call us, you do have 3 up there? Have weapons give us a call
970	misc	misc		**Sgt Ginoble**	Ok
971				**(mp3 2:29:12)**	
972	itk	itk		**Cleveland Center**	Hi Caroline, Cleveland center military again, exactly you told me that you scrambled airplanes out of siffridge and Toledo is that correct?

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
973	itk	itk		**Caroline**	yes sir that is correct, siffridge and Toledo
974	itk	itk		**Cleveland Center**	they are up in the air now
975	itk	itk		**Caroline**	standby 1 sir, I will ask the mission crew commander
976	itk	itk		**Caroline**	so far we think that's affirmative sir is there anything you need
977	itk	itk		**Cleveland Center**	I just wanted to confirm, do you know how many
978	itk	itk		**Caroline**	I think there's 4, sir, hold on lemme check for sure
979	itk	itk		**Caroline**	yes sir they're still up
980	misc	misc		**Cleveland Center**	Thanks
981	misc	misc		**Sgt Ginoble**	hunters id Sgt Ginoble
982	misc	misc		**h2**	hunters id on secure line
983	re	re		**Cleveland Center**	hunters this is Cleveland center can I speak to the mission commander please
984	misc	misc		**h2**	yes sir standby
985	misc	misc		**Maj Nasypany**	Major Nasypany
986	misc	misc		**Cleveland Center**	Major Nasypany, this Tom Kranko, Cleveland center
987	misc	misc		**Maj Nasypany**	Tom go ahead
988				**Tom - Clev Center**	**(not understandable)**
989	itk	itk		**Maj Nasypany**	two military?
990	itk	itk		**Tom - Clev**	two c135s

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
				center	
991	tsu	tsu		**Maj Nasypany**	yea, ok I can have my senior director give you a call everytime someone goes in the air
992	ki	ki			I can give a quick heads up though, I've got two, you know Misty Thunder area
993	ki	ki		**Tom - Clev center**	yea, three up there now
994	ki	ki		**Maj Nasypany**	ok good, that's where im getting a few more out there
995	itk	itk		**Tom - Clev center**	your getting two more
996	itk	itk		**Maj Nasypany**	yea two more and it looks like im getting a few out to the Cleveland area as well
997	itk	itk		**Tom - Clev center**	and who is it this your gonna have call me, because with all these planes coming up we're gonna have to know that…
998	itk	itk		**Maj Nasypany**	major Jeff potter
999	itk	itk		**Tom - Clev center**	major Jeff potter?
1000	itk	itk			Right
1001	suk/misc	suk/misc		**Maj Nasypany**	he's working the midwest issues right now, I got it split into three areas right now..its like assholes over elbows right now
1002	misc	misc		**Tom - Clev center**	alright
1003	misc	misc		**Maj Nasypany**	anymore just give me a call right here,

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
1004	itk	itk		**Tom - Clev center**	what is ur name again
1005	itk	itk		**Maj Nasypany**	my name is…I'll spell it for you nov alpha sierra Yankee papa alpha nov Yankee. I got my a call sign of "nasty" if you need to get a hold of me
1006	itk	itk		**Tom - Clev center**	did you say major?
1007	itk	itk		**Maj Nasypany**	Major
1008	misc	misc			thank you I appreciate it
1009	misc	misc		**h2**	go ahead
1010	itk	itk		**??**	are you running a 4602 code, looks like they ran an intercept about 80 east of Nantucket
1011	itk	itk		**h2**	yes sir we are
1012	misc	misc		**??**	ok id appreciate it..
1013			11:01:58	**15:01:58 (mp3 2:36:58)**	
1014	misc	misc		**Sgt Ginoble**	Hunters, Sgt Ginoble?
1015	coa	coa		**Tom - Clev center**	Hunters, I need to talk to nasty right away please
1016	misc	misc		**Sgt Ginoble**	stand by
1017	itk	itk			whos speaking
1018	itk	itk		**Tom - Clev center**	Cleveland center, Tom Krinko
1019	itk	itk		**h2**	Cleveland center, he's on the line can I take a message?
1020	itk/suk	rta		**Tom - Clev center**	I need to know you got a sting 11 that's circling over Toledo? We've got an unknown aircraft circling over

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
					our facility can we move him over to that position?
1021	itk	itk		**h2**	standby sir we'll check
1022	itk	itk			is it on top you sir
1023	itk	itk		**Tom - Clev center**	its on top of us
1024	itk	itk		**h2**	its right on top of you circling
1025	itk	itk		**h2**	stand by sir
1026	coa	coa			you need sting 11 to go identify him sir
1027	coa*	rta*		**Tom - Clev center**	we need him to do something to get him the hell outta there
1028	itk	itk		**h2**	sir they don't know who it is, go ahead with the position sir
1029	itk	itk		**Tom - Clev center**	the position of..o let me get you the lat-long, the position is right over our facility, dryer BOR…
1030	itk	itk		**h2**	I just need a lat-long sir
1031	itk	itk		**Tom - Clev center**	hold on….
1032	itk	itk		**h2**	Cleveland center are you still there
1033	itk	itk		**Tom - Clev center**	yes im still there, trying to get you the lat-long
1034	itk	itk		**h2**	sir we got it, we got sting 11 in contact
1035	itk	itk		**h2**	Cleveland center have your controllers evacuated
1036	itk	itk		**Tom - Clev center**	yes we have one controller per sector now, we have lat longs for you now…4117 n 8222 w
1037	itk	itk		**h2**	alright sir we'll be all over it..you said 822 w?
1038	itk	itk		**Tom - Clev center**	08222 W

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
1039	misc	misc		**h2**	alright thank you sir
1040			11:06:58	**15:06:58 (mp3 2:41:58)**	
1041	misc	misc		**??**	New York Atlantic, this is hunters id calling.
1042	misc	misc		**Atlantic**	Atlantic
1043	misc	misc		**??**	close to Owens, on a 1545 code
1044	misc	misc		**Atlantic**	mover 22
1045	misc	misc		**??**	ok thank you
1046	coa/itk	coa/itk		**Wash Center**	Hey Hunters, Washington center here, listen we got a call from…we need to get some MedVac airplanes up in the air, would that be a problem if we got them a code
1047	itk	itk		**h2**	for where sir?
1048	itk	itk		**Wash Center**	for the…Washington, DC - Baltimore area
1049	itk	itk		**h2**	if you standby one, I will check with ??..standby
1050	itk	itk		**Wash Center**	Ok
1051	rta	rta		**h2**	sir could you call ?? hotline, Hunters control
1052	itk	itk		**Wash Center**	ok you got the number?
1053	itk	itk		**h2**	I believe its the same hotshots, stand by 1 im gonna see if I can have them pick up
1054	itk/coa	itk/coa		**Wash Center**	you are Washington center? I will have them call you sir
1055	misc	misc		**h2**	thank you bye
1056			11:11:58	**15:11:58**	

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
				(mp3 2:46:58)	
1057	misc	misc		**h2**	secure line how may I help you
1058	imm	imm		**Wash Center**	this I Washington center, we've got a target we need to find out about, he is..DFR
1059	itk	itk		**h2**	hold on
1060	itk	itk			DFR?
1061	itk/suk	itk/suk		**Wash Center**	DFR, 3001 feet, he is 25 miles Northeast out of Dulles airport, on a southwest heading…it looks like you might have a fighter aircraft in his immediate vicinity, at 8000 feet descending, so you might be taking a look at that guy already
1062	itk	itk		**Sgt Ginoble**	ok do you have a mode 3?
1063	itk	itk		**Wash Center**	no he's 1200 DFR
1064	itk	itk		**h2**	1200 DFR
1065	itk/suk	itk/suk		**Wash Center**	the mode 3 on your military looks like 4512, he is directly overhead now.. of the target
1066			11:16:58	**15:16:58 (mp3 2:51:58)**	
1067	misc	misc		**Sgt Ginoble**	ok we'll pass the information
1068					*dial out*
1069	misc	misc		**Oak Grove**	oak grove..
1070	itk	itk		**Sgt Ginoble**	oak grove this is hunters, hey I got a question for you, if you could by any chance you're calling over to us, could you tell us information like call sign, type aircraft, and the center that you contacted

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
1071	itk	itk		**Oak Grove**	on the ones that we're telling you…
1072	itk	itk		**Sgt Ginoble**	yeah if you tell any tracks any that come into our AOR, we just wanna know exactly who they are when they come in
1073	itk	itk		**Oak Grove**	just the ones coming into your AOR?
1074	itk	itk		**Sgt Ginoble**	just the ones coming into our AOR.
1075	itk	itk		**Oak Grove**	Ok
1076	itk	itk		**Sgt Ginoble**	we just wanna know the call signs of the aircrafts that are coming and the craft type
1077	itk	itk		**Oak Grove**	Ok
1078	misc	misc		**Sgt Ginoble**	thank you sir
1079	misc	misc		**Oak Grove**	thank you
1080	misc	misc		**Sam - West sect**	western sectors id..?? Speaking, this lines unsecure how can I help you
1081	ki/bcg	ki/bcg		**Stacia**	hi this is hunters, we have one across from you guys, if you have any tracks over to the northeast, we just wanna know who they are by call signs and type aircraft
1082	misc	misc		**Sam - West sect**	Ok
1083	misc	misc		**Stacia**	if they come into our OAR, if you tel anybody later on, later in the day ok?
1084	itk	itk		**Sam - West sect**	alright is this Stacia
1085	itk	itk		**Stacia**	Yes
1086	misc	misc		**Sam - West sect**	this is Sammy Davis here
1087	misc	misc		**Stacia**	oh I'm sorry Sam

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
1088	itk	itk		**Sam - West sect**	how are things going over there
1089	itk	itk		**Stacia**	shits flying off the handle
1090	misc	itk		**Sam - West sect**	oh I bet, we're pinging over here
1091	ki/bcg	ki/bcg		**Stacia**	its bad, if you guys have any crafts that your telling over, we just wanna know who they are, we just can take anyone as friendly
1092	misc	misc		**Sam - West sect**	oh alright
1093	misc	misc		**Stacia**	thanks honey
1094	misc	misc		**Sgt Ginoble**	open line
1095	misc	misc		**Sgt Ginoble**	hunters id sgt. Ignoble
1096	suk	suk		**Wash Center**	I got one more target squawking 1200 VFR, he's approximately 26 miles Northwest of Dulles, he is on a southwest heading, he dropped altitude
1097	itk	itk		**Stacia**	he's at what squawk sir?
1098	itk	itk		**Wash Center**	he's at a 1200 VFR squawk
1099	itk	itk		**Stacia**	you do not know who this is?
1100	itk	itk		**Wash Center**	no we do not
1101	itk	itk		**Stacia**	and this is Washington center?
1102	itk	itk		**Wash Center**	Yes
1103	misc	misc		**Stacia**	copy we'll pass the information
1104	misc	misc		**Atlantic CG**	this is the coast guard air station Atlantic city again
1105	misc	misc		**Sgt Ginoble**	yes

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
1106	suk	suk		**Atlantic CG**	just so you know one of our search and rescue helicopters is overflying a suspicious 600 foot vessel that is anchored right off of Atlantic city and you got..
1107	itk	itk		**Sgt Ginoble**	a vessel
1108			11:21:58	**15:21:58 (mp3 2:56:58)**	
1109	suk/ki	itk/ki		**Atlantic CG**	right we're flying over it right now trying to figure out why its doing it.
1110	itk	itk		**Sgt Ginoble**	what's it doing
1111	itk	itk		**Atlantic CG**	Huh
1112	itk	itk		**Sgt Ginoble**	how is it being suspicious
1113	misc	misc		**Atlantic CG**	let me put you on hold
1114	misc	misc		**Atlantic CG**	you there
1115	misc	misc		**Sgt Ginoble**	yes I am
1116	suk/kt/sb	tmmd/sb		**Atlantic CG**	ok its sketch but theres a 600 foot vessel with 1200 people onboard, foreign captain, mass onboard, as soon as the crash happened, this ship was sitting off shore for two days, came in and anchored 600 yards off the coast of Atlantic City and we've got Coast Guard vessels querying it, just to let you know we got Helos asking the Master questions on the radio, and that helicopter was initially manned for New York
1117	itk	itk		**Sgt Ginoble**	what call sign is that helicopter at
1118	misc	misc		**Atlantic CG**	hold on
1119	itk	itk		**Atlantic CG**	6579
1120	itk	itk		**Sgt Ginoble**	6579...do you know what the register of this vessel is

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
1121	itk	itk		**Atlantic CG**	we don't know…it's a cruise ship, we're collecting ID and all that , I'm going to let you talk to the controller that's working that case
1122	suk	suk		**Atlantic CG**	Hi this is ? Schwartz, just so you know we have a cruise ship off shore that's being suspicious, as far as being out there and its next port of call is New York city, we have a patrol boat that's heading up from Virginia and we have our small boat from Atlantic City to ID the boat with some information than we have already
1123	ki/suk	ki/suk		**Atlantic CG**	our helicopter just overflew and gathered some information, the information that we got from the helo matched what we got from the vessel earlier, we're gonna keep an eye on it , that helo has just returned on deck, they're gonna be picking up some medical supplies, and returning up to New York to help with the MediVac from the world trade center
1124	itk	itk		**Sgt Ginoble**	you got the boats going up there to query the vessel correct?
1125	itk	itk			id like to know the registry of the vessel if you could please
1126	itk/coa	itk/coa		**Atlantic CG**	British flag vessel…we're gonna contact our district and we're gonna contact DoD and you guys will get word through them, otherwise
1127	misc	misc		**Sgt Ginoble**	ok, fantastic
1128	misc	misc		**Atlantic CG**	thank you sir
1129			11:26:58	**15:26:58 (mp3**	

Line	Coder 1	Coder 2	Time (EST)	Speaker	Statement
				3:01:58)	
1130	misc	misc		**Atlantic CG**	coast guard Atlantic city
1131	misc	misc		**Stacia**	hey its Hunters ID, Northeast Airborne Sector
1132	misc	misc		**Atlantic CG**	Ok
1133	itk	itk		**Stacia**	someone just called here about a suspicious vessel of the coast of Atlantic City?
1134	itk	itk		**Atlantic CG**	Yes
1135	itk	itk		**Stacia**	is there anyway I can get a position on that?
1136	itk*	misc*		**Atlantic CG**	yes you ready
1137	itk*	misc*		**Stacia**	Ready
1138	itk	itk		**Atlantic CG**	lat 39 degrees 24.5 N long 074 degrees 11.6 W, name of the vessel The Aurora,
1139	misc	misc		**Stacia**	ok
1140	suk	tmmd		**Atlantic CG**	approx 800 feet long cruise ship, white hull and 1208 crew…no actually 804 crew, 404 passengers, British flag…we have boat going out there to collect more, we already overflew it with our helo and we talked to him here with our control center
1141	misc	misc		**Stacia**	Ok
1142	ki*	tmmd*		**Atlantic CG**	but it does seem suspicious
1143	misc	misc		**Stacia**	ok alright thanks a lot
1144			11:31:58	**15:31:58 (mp3 3:06:58)**	

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